BULLETIN of the
SCHOOL OF EDUCATION
INDIANA UNIVERSITY

Planning School Buildings for Tomorrow's Educational Program: Proceedings

Vol. XXIII, No. 5 September, 1947

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FOREWORD

On July 25 to 26, 1947, the School of Education of Indiana University held an educational conference for school administrators, school board members, architects, and others interested in the construction, maintenance, and operation of school buildings, on the subject "Planning School Buildings for Tomorrow's Educational Program."

Harold E. Moore, Superintendent of Schools at Mishawaka, Indiana, served as chairman of this conference. Dean Wendell W. Wright, of the School of Education, Indiana University, gave the welcoming address, and H. B. Allman, Director of Summer Sessions at the University, gave a statement of the conference objectives. Presiding officers for the different sessions of the conference included R. D. Orcutt, Clerk of the Board of Education at South Bend, Indiana; Wayne Watson, Superintendent of Schools at Terre Haute, Indiana; A. T. Lindley, Superintendent of Schools at Peru, Indiana; and Ralph Becker, Superintendent of Schools at Evansville, Indiana.

Conference speakers included E. T. Peterson, Dean of the School of Education, State University of Iowa, Iowa City; John E. Nichols, architect, West Hartford, Connecticut; W. F. Clapp, Chief of the Division of School Plant, State Department of Public Instruction, Lansing, Michigan, and President of the National Council on School House Construction; and Leonard V. James, Lighting Consultant, General Electric Company, and Chairman of Commission on School Lighting, Illuminating Engineering Society; and Paul W. Seagers, Assistant Professor of Education, Indiana University.

During the Friday evening session a panel discussion was held on the subject, "Looking Ahead in School Building Planning and Construction." L. B. Perkins, architect, Chicago, Illinois, acted as moderator and discussion leader, with E. T. Peterson, J. E. Nichols, W. F. Clapp, P. W. Seagers, and H. E. Moore taking part in the discussion. This discussion was recorded on a wire recorder borrowed from the Department of Speech, through the courtesy of Lee Norvelle, and is included in this report of the conference proceedings.

Persons who registered at the conference are listed below:

George O. Adamson
Oral V. Adamson
Agnes Adcock
H. B. Allman
A. L. Barnett
W. M. Barr
W. R. Bokelman
Fred J. Bonebrake
Ruth Boring
Eugene L. Brown
Everett I. Brown
Mrs. Ruth Brubaker
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Donald Brunbaugh
L. Talbert Buck
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George H. Bush
Robert Cairns
Mary B. Custer
Roy W. Caughran
A. R. Chadd
Dwight E. Cocharan
Mildred Cole
D. E. Compton
B. J. Conkey
M. D. Cory
Leo J. Costello
George W. Courtney
Myron M. Cox
H. E. David
Lempha C. DeWeese
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Maxine Dunfee
Herbert Edwards
Lee Eve
Paul C. Fawley
Andy Fernung
Knofel E. Fortner
William H. Fox
Adda Fraley
Edward K. Glenn
John Goode
B. W. Gorman
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Vincent R. Guenther
Carolyn Guss
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Erb Hanson
Merritt Harrison
Jacob Hartman
Fred J. Hartstern
Wayne Hays
Verdon Higgins
Floyd A. Hines
John Hission
E. B. Holden
Orville J. Hooker
E. S. Houston
Otto Hughes
Charles G. Hunt
William Hurdle
Herbert T. Jackson
Leonard V. James
Paul F. Jernegan
George C. Johnson
Terrence A. Kleckner
Martin L. Krauss
Peter Vander Laan
Merle E. Lamon
Ruth L. Laughlin
Samuel J. Law
C. Calvin Leedy
Leonard W. Lehman
Nelson G. Lehsten
James H. Leonard
A. T. Lindley
Elbert L. Lockridge
L. A. Lockwood
Raymond V. Long
E. H. McComb
John H. McNormara
Thomas MacOwen
W. H. Marker
J. C. Matthews
Harold Michel
Lon P. Monbeck
H. E. Moore
C. H. Moran
H. H. Mourer
E. O. Muncie
F. W. Nevosad
John E. Nichols
R. D. Orcutt
Earl Pike
Carl Porter
Eleanor Pumphrey
Fred W. Ranken
Harry E. Ray
Lucile Richman
Mary E. Ronk
Irene D. Rose
Frank A. Ross
Max B. Roush
D. M. Royer
Connor K. Salm
N. Louis Samaha
Harry G. Schaefer
Karl R. Schwars
Paul W. Seagers
J. R. Shaffer
William B. Sharp
Mark A. Shellhaas
Wilbur B. Shook
C. L. Shweby
Edward E. Simmons
Donald L. Simon
F. Edna Skinner
H. B. Slaughter
H. L. Smith
F. S. Snow
M. E. Stapley
Carl J. Stewart
Harold A. Stewart
Eugene H. Stone
Betty Stoops
Gordon H. Stow
George D. Strayer, Jr.
R. F. Summers
Wilfred Susott
C. J. Swarens
Nelson Swift
Wayne E. Swihart
Harry E. Taylor
Homer H. Terrell
Georgia Thompson
S. Boyd Todd
John R. Troy
Glen D. Vannatta
William H. Wagoner
C. V. Wait
Harold Wakefield
Wayne P. Watson
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WELCOMING ADDRESS

by

WENDELL W. WRIGHT

I AM especially happy to have the opportunity to say welcome to the conference on schoolhouse planning. However, I know that it is useless to say, "Welcome to Indiana University." You know, if you know the University, how welcome you are here. We have looked forward to these few days with anticipation in our association with this splendid staff carrying forward the conference on such a vital problem.

The School of Education at Indiana University has for a long time believed that one of its very real functions was to work with the people of its state toward the solution of the problems which they face. It has been in accordance with this tradition that, as I have built up the staff during the last year and a half, I have followed the lead of Dean Emeritus H. L. Smith, who guided the School of Education so well for so long a period of time.

Into each of the areas of specialized work, such as elementary education, secondary education, schoolhouse planning, and other areas, I have invited new people to join our staff. In doing so, I have made it perfectly clear to them that their responsibilities were many, but that, among these responsibilities, one of the most important was that they should provide help and leadership to school people in the state in relation to problems of the public schools. In each of these fields, I have added new staff members who were highly interested in their particular field. I look forward to the next several years when these young men will become one of you, interested in your work in the state. The School of Education of Indiana University intends to work cooperatively with you in relation to school problems. Among these young men joining our staff is Paul W. Seagers, who has already made himself known nationally in the field of schoolhouse planning. He will work with you next year, and in the years that follow, on this very vital and interesting problem.

THE CURRENT SCHOOL BUILDING PROBLEM

(Abstract)

by

E. T. PETERSON

THE heart of the current problem is expressed in the theme of this conference: "Planning School Buildings for Tomorrow's Educational Program." The central problem is to define the essential characteristics of the educational program of tomorrow with sufficient detail and specificity to provide the educational specifications for design and plan. We know that it is impossible to organize a modern program of elementary education in a building consisting of a nest of 22′ by 30′ classrooms. This means chaining youngsters to pedestal desks anchored to the floor. It commits tomorrow's children to yesterday's conception of the learning process in which the learner is a passive receptor instead of an active participant. Yet the majority of plans now on the boards which I have looked at use the good old "standard" 22′ by 30′ room.

It is my purpose to center attention on the basic factors which should condition our planning. We are just beginning to realize the nature of this impact of total war on our lives and our social institutions. Mobilization for and participation in total war is a brutalizing experience. It is essentially a reversion to savagery—a shedding of the veneer of civilization. It is destructive of material and human resources. It destroys human values and standards of behavior. It undermines the basic social institutions—the family, the home, the church, the press, the social group, the school.

The school is in losing competition with the mass media of communication—the movies, the radio, the pulp periodical, the tabloid press. We turn these powerful and dramatic instruments over to private enterprise and the profit motive. They sink each season to new lows in pandering to the lowest common denominator in human nature and in violating the most elementary standards of decency. We must face the problem of realizing that the net impact of these forces on children and youth is destructive. We must address our efforts to improving the quality of life in our communities.

In this task, the school must assume a central role. It must become the focal point for rallying the resources of our communities in order to provide a variety of activities and experiences which are constructive, not destructive—which conserve and elevate the intellectual and spiritual life. The community-centered school is not a fad; it is a cultural and moral necessity.

School building planning must therefore be concerned with much more than the formal needs of schooling. It must grow out of a broad analysis of the cultural, recreational, and vocational needs of youth and adults. It must start with the community survey.

This approach is most critical in smaller communities. In general, our large cities can command adequate technical and professional services to do a competent job of planning. But such services are conspicuously

absent in smaller communities and in rural areas. In my own state of Iowa, 57.3 per cent of the population is in the open country or in communities of 2,500 or less. The situation in Indiana must be quite similar.

Such a survey is currently under way in the Tipton, Iowa, consolidated school district. Tipton is a typical county seat town of 2,500 population. Faced with a school building problem, it decided to engage in a systematic study of the needs of youth and the present resources available to meet these needs.

The fundamental proposition on which the Tipton Youth Survey was inaugurated was that school building planning, adjustments in the educational program, and more effective service to the community would be more efficiently brought about by an extensive preliminary survey of the primary conditions affecting goals.

In smaller communities it is not too difficult to secure data of the nature required in a preliminary survey. The feeling of "belonging" to the community and a sense of mutual responsibility for community welfare is stronger in these smaller localities. There is an absence of the anonymity of the individual which is characteristic of the larger or metropolitan areas. This sense of being well defined with the small community results in a high degree of community interest on the part of the individual and a willingness to participate in community betterment activities.

The community survey including the divisions enumerated below is leading to fundamental conclusions as to what plant facilities are required to meet the curricular, occupational, social, recreational, and guidance needs of community youth and adults.

1. Identifying what area can properly be included in this natural community.
2. Evaluating population trends and composition for the area defined.
3. Completing a follow-up study of both graduates and non-graduates of the institution under consideration for at least a ten-year period.
4. Conducting an occupational analysis of community business and industry to determine the nature and extent of youth employment opportunities locally.
5. Conducting a farm resident occupational inquiry to determine the potential rate of absorption of farm youth in farm jobs.
6. Evaluating present curricular offerings.
7. Making an analysis of present plant use.
8. Evaluating child accounting statistics.
9. Describing and evaluating recreational opportunities for youth and children.

The magnitude of such a survey requires that it be a cooperative undertaking. The planning of the content and procedure to be employed in securing data for each division of the survey should be the work of those who are best versed in that particular area and who are reasonably available geographically within that state. Personnel of the State Department of Public Instruction, of the College of Education of the State University, of the State Agricultural College, and local educational

personnel are working cooperatively in developing, conducting, and evaluating the survey. Specific responsibility for the completion of the survey is assumed by the high school principal.

A Youth Survey Advisory Committee of 27 community residents—both town and farm residents—was appointed at the beginning of the survey. It has served as a very useful sounding board of community opinion and reaction and at the same time has ably served as an interpretative agency to the community in general of the progress of the survey.

Fifteen Youth Survey Advisory Committee members conducted the interviewing of local employers. These members were coached on using an employer interview schedule which had been developed with the aid of the Director of Vocational Education Division of the State Department of Public Instruction. They interviewed 140 business establishments.

This survey, while still in the initial stages, has produced dramatic results. There has developed a much clearer conception of the community's responsibilities to both youth and adults. Before the survey began, five acres had been acquired and regarded as sufficient for program development. This has now been increased to 30 acres. Preliminary planning of building facilities is proceeding on a much broader scale of adequacy. Community support for the expanding program is assured.

A GUIDE FOR PLANNING SCHOOL PLANTS

by

WILFRED F. CLAPP, Chief,
Division of School Plant,
Michigan State Department of Public Instruction,
and
President, National Council on Schoolhouse Construction

THIS nation is faced with the greatest volume of school building construction in its history. The way in which this building program is planned and carried out will have a permanent effect on the educational picture in the United States. It can be poorly planned or it can be wisely planned. If poorly planned, it can result in extravagant construction, unnecessarily high operating costs, overlapping attendance areas, a freezing of existing school district boundaries, the perpetuation of the small high school, and the stymying of desirable changes in educational programs. Properly planned, it can have just the opposite effect. Our buildings can be friendly and inviting to children or they can be monumental and forbidding. They can be safe and healthful or they can, by their very nature, teach unhealthful and unsafe habits. A school building can encourage instructional improvement and curriculum change or it can prevent it.

That there is a great need for more adequate planning can certainly not be denied. The major part of such planning must be done at the local level by local people. In the past, and I am afraid at present, entirely too much educational planning has been done in the architect's office and not nearly enough by the people who ought to know the most about the kind of building needed and the kind of educational program to be operated in that building.

Although the planning of school buildings is and ought to be primarily a local function, there is a great need for outside consultant service. A school district does not build every day. The larger cities may have long-term and somewhat continuous building programs, with competent training staffs to carry them out. Yet, even these larger cities often feel the need for outside planning help. In the smaller districts, the need for such service is even more urgent. The small district builds intermittently and may replace 50 to 100 per cent of its total school plant at one time. The administrator may have had no experience or training in building planning. Furthermore, he is probably somewhat reluctant to take too active a part in the planning, knowing full well that school districts commonly change superintendents immediately after a building program. So most of the planning, educational and structural, is left to the architect, oftentimes with quite unsatisfactory results. Were the local school officials able to obtain competent outside assistance, many mistakes could be avoided and wiser long-term planning might result.

There is a woeful lack of such service available. In many parts of this nation the administrator has literally nowhere to turn. Such service

should be provided by every state department of education. Actually, only 22 state educational departments have organized school plant divisions and many of these are so inadequately staffed and so burdened with other assignments that they can only give the most meager service. Certainly the welfare of children demands that the state education office ought to be equipped to examine plans and specifications and to approve them at least as to reasonable requirements for health and safety. Beyond this regulatory function, however, there is a great need for operation on a service basis to help local districts in planning a program so that the right kinds of buildings will be built where they should be built. There is just as much need for prevention of the construction of some buildings as there is for the encouragement of others. In some areas state universities are giving such service, but in general there is a sad lack of help for the local district in this important field. There is also a lack of recent literature in this field. True, one may obtain much help from current educational periodicals or from *American School and University*. Help may be obtained from publications of the Illuminating Engineering Society, the Engineering Association, the National Fire Protection Association, etc.

Most of the basic principles laid down by Moehlman, Engelhart, and others are still valid, but there is a need for further authoritative material in the light of technological and educational progress put out since some of these standard works were written. The average small town school administrator has neither the time, the energy, nor the resourcefulness to go deeply into this field. He is faced with too many other pressing duties and problems.

The National Council on Schoolhouse Construction has realized this need and is attempting to do something about it. This organization has approximately 100 members, largely men who spend a major portion of their time in the school building field. These include federal, state, and city school building specialists, plus a few university men teaching courses in school administration and school buildings, and other men in similar work. The organization was founded in 1921 and has held annual meetings since that time. The first purpose of the organization was stated to be "to promote the establishment of reasonable standards for school buildings and equipment, with due regard for economy of expenditure, dignity of design, utility of space, healthful conditions, and safety of human life."

The first standards developed by the organization appeared in 1930, and each year thereafter they have been revised and supplemented. These standards no doubt have had a great effect on the design of the school buildings throughout the nation. They represent the results of energetic labor on the part of members of the Standards Committees.

In 1943 the Standards Committee of the Council raised many fundamental questions about the form and scope of the standards. The Council at that time decided to take a new approach to the standards question and instructed the Committee to submit a revised draft. This work was delayed by the war and the cancellation of the 1944 meeting.

At the 1946 meeting, as a result of further deliberations, the President appointed a Central Standards Committee, with each member of the Central Committee to serve as chairman of a subcommittee. It was the task of the group to rework, amplify, and restate the Council's standards. The General Education Board subsequently granted funds to the Council to finance the preparation of the new publication. The efforts of the Standards Committee and its subcommittees resulted in a new document which was submitted to the Council at its meeting last October in Jackson, Mississippi. After several days of intensive work by the entire Council, a revised draft was accepted and ordered published as a tentative working copy subject to continuous revision and improvement. This document is entitled *A Guide for Planning School Plants.* It is just now coming off the press. You may obtain a copy by writing to S. P. Clemons, Director, Division of Schoolhouse Planning, Department of Education, Tallahassee, Florida. The price is $1.

Now a few comments about the *Guide* and its content. First, it should be emphasized that the *Guide* is more than a set of rigid standards. In fact, there is not set forth at any one place in the *Guide* a condensed set of rules or standards; rather, the *Guide* is concerned as much with the WHY as with the HOW. It is intended to promote creative thinking on the part of the architect and the school administrator rather than to give absolute and final answers. The introductory section of the *Guide* attempts to set forth two main ideas:

1. The plant will be well planned only if such planning is done in relation to the kind of educational program to be carried on.
2. The planning of a building is not a one-man job but, rather, should be a cooperative effort on the part of all who are to use the building.

The next section takes up site selection and development and includes such subsections as location, size and shape, physical features, relation of building and site, recreation areas, playground equipment, and landscaping.

The third main section discusses general characteristics of the building. I believe this section is one of the most significant of the entire *Guide* and is likewise the most highly controversial. At least it was found to be that way at the general meeting of the Council. The responsibility for this section rested largely with Charles Bursch, of the School Building Division of the California State Department of Education. The subsections are:

1. Planning school buildings to reflect use
2. Flexibility and expansibility
3. Conditioning school rooms for visual comfort and efficiency
4. Conditioning school rooms for hearing ease and noise control
5. Planning for convenient student circulation
6. Planning for structural adequacy

This portion of the *Guide* will, we believe, have a marked effect on school building design.

The next main section concerns instructional rooms and their equipment. Although this section is well done, it is as yet quite incomplete and really can only hit the high spots regarding the different instructional facilities needed in a school building. It contains material regarding elementary school classrooms, secondary school classrooms, and specialized facilities, such as science laboratories, homemaking rooms, business education rooms, art rooms, shops, and facilities for the handicapped.

The next section takes up general facilities and includes material regarding administrative facilities, the library, the auditorium, indoor physical and health education facilities, and food service facilities.

Another section discusses service facilities. This section includes a splendid subsection on audio-visual and communication facilities. Also included are fire protection, custodial service rooms, sanitary facilities, and heating and ventilating facilities.

The final section of the *Guide* includes material regarding accessory facilities such as the school bus garage, the school cannery, and facilities for camping education.

It goes without saying that the *Guide* is neither complete nor final. Probably it never will be. It can only touch the high spots. It needs amplification and constant revision. It does bring together in one publication a large amount of information about recent developments in planning school buildings. It certainly does not give complete answers and cannot replace the need for competent state consultant service. Nor can it be a substitute for intense cooperative effort at the local level. If it tends to stimulate more adequate local planning, and if it gives local planning groups something to work with, it will have accomplished its purpose. Please think of it as a trial document. Use it, and let us know how it can be improved. We need your help.

A STATEMENT OF CONFERENCE OBJECTIVES

by

H. B. ALLMAN

INDIANA University has a responsibility to the state to provide favorable opportunity to study and discuss all types of problems that are of vital concern to its citizens. Problems of major importance that should be given high priority are those related to the common public services, such as education, transportation, and sanitation. The School of Education stands ready to provide help with the numerous problems of public education that are pressing for early solution.

The University also has an obligation to make its facilities available to leaders of the state to meet, each with the other, in friendly assemblages to renew acquaintances, to multiply friendships, and to exchange experiences. Here at the University, in an atmosphere of cordial hospitality, educational leaders may fellowship together and help each other in the solution of perplexing local problems. The lounge, corridor, and campus sessions vie with the formal programs in the benefits to be derived.

These conferences on school building problems are becoming an important tradition in the School of Education, and we hope that this 1947 session will be a significant addition to the series of such conferences.

The problems of providing adequate physical facilities and proper housing are the most imminent problems facing school administrators and officials in the era which is just ahead. The holiday on the construction of new buildings, occasioned by the war, has been too long. It must end soon. The improvement of present school plants and the erection of new buildings cannot be delayed longer. The approximately eight and one-half billion dollars invested in public school properties is one and one-half billions short of the needs. The National Education Association Research Service predicts that, in the ten-year period from 1945 to 1955, the total capital outlay for public school buildings, sites, and equipment will approximate $1,347,200,000. If this tremendous job is to be done well, all the help available for careful planning should be utilized.

The objectives of this 1947 conference are related to the building problems that are immediate and urgent as well as to those that are more remote. They are:

1. To provide a fitting climax for the credit course in School Grounds, Buildings, and Equipment, Education 566, which has been meeting on an intensive schedule during the past two weeks. (These students are members of this conference group. They will profit through your practical experiences, and you may benefit from their recent studies of all types of school building problems.)
2. To assist in integrating local and state planning board plans into a balanced and well-timed program of public building.

3. To provide advice for building well-balanced programs for financing both current costs and building construction through the interpretation and application of recent laws designed to increase corporate capacity to build new buildings and to accelerate building construction. They are:
   a. The cumulative School Building Fund
   b. The finance of school buildings by civil townships
   c. The non-profit School Building Corporation
   d. Reappraisement and reassessment of real estate
4. To evaluate the best of "the old" and to reveal the latest of "the new" in schoolhouse construction and equipment.
5. To bring, to you, leaders who are expert in both planning and financing building projects.
6. To provide opportunity for personal conferences with these experts on problems that are peculiar to particular local school corporations.
7. To discover problems that may become the basis of future studies and investigations in the field of school building construction.

We welcome your suggestions for improving future conferences and for extending University service into new fields. If we are failing to anticipate your needs, be sure to let us know what we can do to serve you better.

THE SCHOOL BUILDING CONSTRUCTION PROBLEM TODAY

(A Condensation)

by

JOHN E. NICHOLS

IN communities throughout the nation, educational authorities are confronted by a situation that has been in its development for years. It is a situation that stems from advances in education itself, from a long-term trend in the building industry, and, more recently, from conditions that have grown out of the war. It is a situation which not only is serious at the moment but which may cast a shadow over the future welfare of education.

The schoolhouse erected 50 years ago was a simple and inexpensive structure compared with that usually erected today. Then, a typical building consisted almost wholly of classrooms clustered around toilets and a heating plant. The site was barely sufficient to accommodate the building. The auditorium, if one existed, occupied otherwise wasted attic space. If there was a shop or a homemaking laboratory, it was relegated to left-over basement rooms. Rarely was there a gymnasium such as we know it today, with locker and shower rooms, designed for community use. A lunch room and kitchen was a rarity. If the school boasted a library or a health room, it was sure to be little more than a closet. The high school was a college preparatory institution with only the most primitive laboratory and work facilities.

Not only was there little other than classrooms, but the number of classrooms was fewer because fewer children attended school and because into each of the classrooms were crowded far more pupils than accepted practice today would allow.

The school building of 50 years ago was less in quality as well as quantity. Modern standards of safety and health, comfort, and convenience were undreamed of. Buildings were not fire resistant. In place of today's batteries of fluorescent lights, there hung perhaps one or two bare carbon lamps. There were no automatic temperature controls, no finely engineered ventilation systems, no closed circuit fire alarms, no intercommunicating and central clock systems—little indeed of those mechanical refinements that account for perhaps a quarter of a building's cost today.

But aside from those increases in the cost of school buildings attributable to greater quantities and higher qualities of construction, we are faced with yet another factor, the increased *unit* cost of those quantities and qualities. I am not referring here simply to the diminished value of the dollar generally, but to the more greatly diminished value of the dollar used for the purchase of construction. Technological economies in production have lowered the cost of most consumer goods in relation to buying power. This is not so, however, for custom-built, hand-built structures. Over a period of many years when costs generally

rose, the cost of construction rose more; when costs generally fell, the cost of construction fell less. And the end of this divergence is not yet in sight.

Thus it will be seen that recent events have served only to aggravate a situation that in reality has been stealing up on us for years. Most building materials and manufactured items are still unavailable or available only at premium prices. Promised delivery dates are set far in the future—and what prices are to be at the time of delivery is unknown when orders are placed. Building mechanics, diverted to other pursuits during the war, are scarce, and their hourly output is generally considerably below prewar levels. Contractors' overhead expenses have been increased by delays. Uncertainty concerning the future is rife. As a result, quality for quality, the unit cost of school buildings has risen practically 200 per cent since 1938. What cost the taxpayer $100,000 then would now cost him almost $300,000.

While the cost of school construction has increased three-fold, the ability to finance construction has risen very little. Receipts from real estate taxes are still the general means of financing capital improvements. Yet real estate valuations for tax purposes have not begun to follow the increase in sale values. Whereas tax valuations were always notoriously low in many localities, thus limiting borrowing capacity, the discrepancy is now ridiculous. More and more communities are finding it utterly impossible, in the face of statutory debt limitations, to borrow sufficiently to undertake the construction that is needed.

Yet the need is tremendous. Twelve years of depression and war have prevented even normal replacement due to obsolescence, let alone the construction of those new buildings made necessary by increasing and shifting school populations. Probably more communities than ever before in our history are at this time in need of new school construction and are actively anticipating it.

The urgency of these needs, and the growing impatience of educational authorities, parents, and the public at large with long-continued delays in meeting them are giving rise increasingly to a desperate inclination to accept half a loaf as better than none. Therein lies a threat to the future of education. School buildings, once erected, continue substantially unaltered for years on end, promoting or hindering the educational process which they were meant to serve. We know from bitter experience that deficiencies generally go uncorrected as long as there is "seating space" for the pupils who must be accommodated. The expectation that whatever is omitted initially will later be added, as funds become available, too often is based on wishful thinking.

We cannot afford to adopt a defeatist and opportunistic policy. We must not revert to that which will not serve adequately today's, let alone tomorrow's, educational needs. We will not, in the long run, benefit education by erecting buildings that are throwbacks to the time when classrooms made no provision in size or equipment for other than a passive reading-and-recitation type of learning program, when auditoriums were novel items of extravagance, when there were no gymnasiums or lunch rooms or health units to promote sound physical

development, when shops and laboratories were stepchildren. Yet that is the course we are taking with increasing frequency.

Whereas two years ago architects and others connected with the building industry confidently expected a rapid decline in construction costs to a point 40 per cent or so above 1938 levels, their outlook now is much more pessimistic. Probably, if we can judge from the past, construction costs will never again in our lifetime reach their former levels relative to other costs. But much readjustment will, of necessity, take place, even though it is brought about by a more pronounced devaluation of the dollar outside the construction field and by a corresponding readjustment of the tax base.

Until some measure of stability has been reached, we shall do well to delay whatever construction we are unable to perform properly, even though it entails the continued use of obsolete structures and inadequate facilities, patching and repairing, the inconveniences of extended transportation, and even double sessions.

Where construction is completely unavoidable, we can best do without those refinements that add to comfort, convenience, and self-esteem, but that do the least to provide the tools of education and the essentials of safety and health. Stylistic elegance can give way to simpler forms, brick and stone to less costly materials. The exigencies of wartime school construction have taught us a lesson we had best not forget. We can amputate cleanly those building elements which we cannot afford, rather than succumb to the temptation to compress the whole. We can adopt less complex methods of fabrication, more efficient forms of standardization. We can improvise dual uses of facilities to increase their effectiveness for education.

I do not profess to know all the ways by which we can solve or even lessen the dilemma we face. Nor will a situation that has been years in the making be solved over night. I am sure, however, that, with courage and ingenuity, patience and restraint, we, the educator and the architect, can do much to prevent the perpetration of a crime against those children whose welfare 30, 40, and even 50 years hence is in our hands today.

MODERN SCHOOL LIGHTING

by

LEONARD V. JAMES

THE past ten years has seen an increased interest in all lighting, both with reference to the quality and quantity of illumination results and also regarding the facilities needed to provide this illumination. As a result, radically changed standards have been adopted in nearly all fields, with the least definite action in school lighting. A committee was, however, appointed in late 1943 by the President and Council of the Illuminating Engineering Society to study this subject of school lighting and to prepare a report. This report has been completed and referred to the American Standards Association for consideration as a revision of the "A-23 American Standard Practice of School Lighting" last revised in 1938. These remarks on "Modern School Lighting" present the views on the subject as held by a majority of the I.E.S. School Lighting Committee, and will be broken down into divisions corresponding with chapters in the report of that committee.

Whether school lighting results from the use of natural sources or artificial sources should make little difference in a study of the general seeing conditions—either one should be so controlled and utilized that the best possible seeing conditions result. A helpful report should also present the economic factors of lighting (just as important as the more technical factors involved) and should include comments on the most permanent part of any lighting installation, the wiring. All of these will be considered in these remarks, although not necessarily in the order indicated.

The committee has felt that the objective of such a report should be "to establish criteria of good illumination for the guidance of architects, engineers, school people, and others interested in the conservation of children's vision and in the efficiency of pupils and teachers, and also as a guide for the user in stating his lighting requirements." Illumination may be defined as good "when it is suitable in quality and quantity for: (1) creating general environmental brightnesses agreeable and beneficial to the user, and (2) permitting a high degree of efficiency in seeing the necessary tasks with a minimum of effort." These expressions are quoted from the report.

Recognizing that the one need for any illumination, natural or artificial, is as an aid in seeing, the committee notes that "satisfactory seeing requires not only a comfortable visual environment but also suitable visibility characteristics of the tasks." The character and amount of light reflected from the task is one of these visibility characteristics, other important characteristics being size, contrast, and time. The comfortable visual environment is provided when the brightnesses of objects and surfaces in that environment are similar in value.

To provide these conditions, the committee would require certain limiting values as to footcandle levels at the work and as to footlambert brightnesses in the field of view, as indicated.

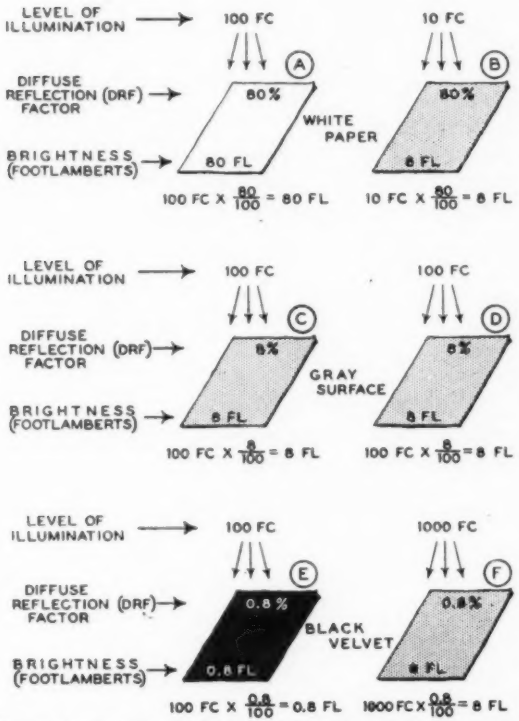

Fig. 1. Influence of reflectance on brightness: in the left colum for the same illumination level on all samples; in the right column for levels of illumination to provide the same brightness of all samples. (From Light, Vision and Seeing, by Matthew Luckiesh, D. Van Nostrand Co., New York, 1944.)

Current recommended minimum footcandle levels to be maintained in service are based upon a value of 30 footcandles for classrooms (on desks and chalkboards), for study halls, lecture rooms, art rooms, libraries, shops, laboratories, and offices; 50 for rooms used for drafting, typing, and sewing, for partially seeing pupils, and for pupils requiring lip-reading; 20 for reception rooms, gymnasiums, and swimming rooms; 10 for auditoriums (not for study), cafeterias, locker rooms, washrooms, stairways, and corridors containing lockers; and 5 for open corridors and store rooms. "Current recommended practice" is interpreted as meaning, as of today, recognizing the possibility of further revision at a later date.

Brightness is an indication of the amount of light entering the eye. It is what the eye sees and, from a lighting standpoint, is therefore the most important visual characteristic of objects and areas. Reflected brightness is a product of the amount of light available per

square foot, or footcandles, and the reflectance or reflection factor of the object. Thus, if the level of illumination on a piece of white paper is 10 footcandles and the reflectance of the paper is 80 per cent, the brightness, called footlamberts or reflected footcandles, is 8. (See Fig. 1.)

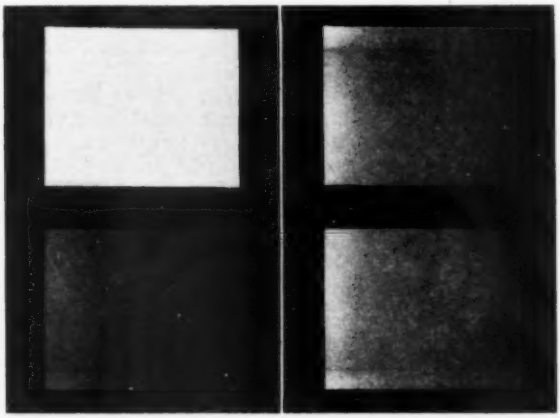

Fig. 2. At the left, two boxes, with the same amount of illumination provided, disclosing their true colors (near-black and white); at the right, the same boxes, with the illumination inversely proportional to the reflectances of the walls, so that they have the same appearance.

Strange as it may seem, if the footcandle level on a piece of gray paper is 100 and the reflectance is 8 per cent, the footlambert brightness will also be 8, exactly the same as that of the white paper. Also, if the level on a piece of black velvet is 1,000 footcandles and the reflectance is .8 per cent, the footlambert brightness again is 8, as before. And these three surfaces will appear exactly the same to the eye, provided the illumination is confined to the area and is not permitted to provide revealing or tell-tale borders. Such conditions can be shown in so-called shadow boxes, easily constructed in the school shop or physics laboratory, and are certainly very eloquent and challenging. (See Fig. 2.)

Since the brightness in footlamberts is really a measure of the amount of light entering the eye, it is the determining factor in the response and adaptation of that eye. It can be shown that, for certain conditions, the visibility of details, or visual acuity of the eye, continues to improve apparently without practical limits, as this brightness of the object is increased. For this reason the only real limitation of desirable levels of illumination, in schools and elsewhere, seems to be economic or relative cost.

It is obvious (see Fig. 3) that marked contrasts in brightness as between details of a visual task, such as between the letters on a printed page and the page itself, will aid in discernment of those details, and such contrasts are usually provided by differences in reflectance—black on white, for instance. But when these differences are for large sur-

faces, not minor details (see Fig. 4), or where they are of a very high order, as between the sun (or a bright light source) and normal surrounds, it is a different story. This illustration happens to be a "before" figure, in a pair, and is a fair representation of bad conditions which,

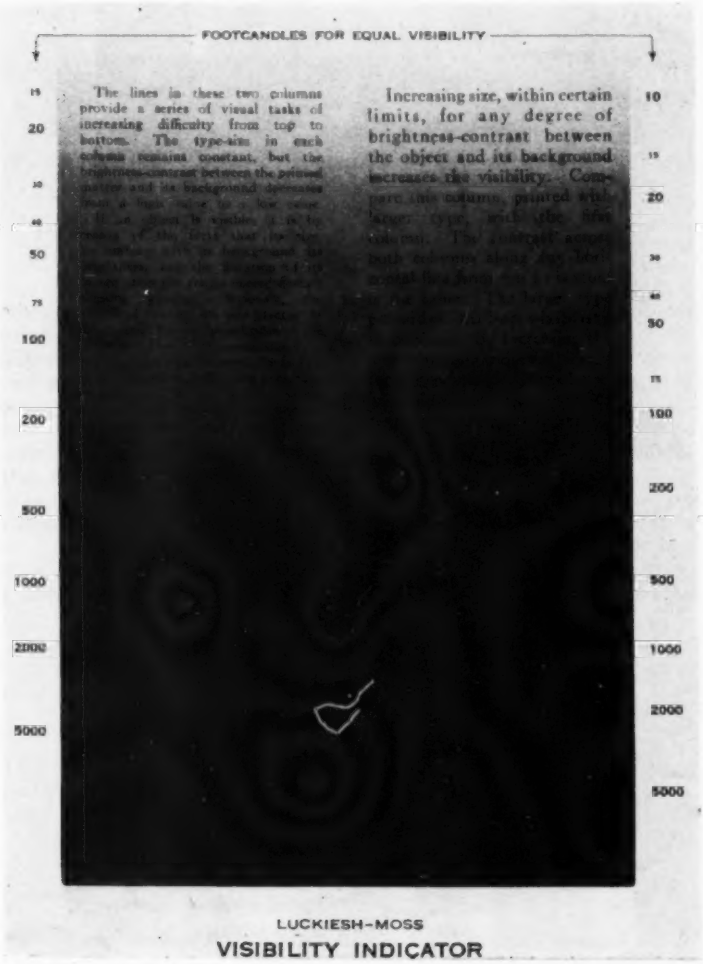

Fig. 3. Poor contrast reduces visibility; however, increasing the illumination level will compensate in part for this condition.

Fig. 4. A school room before being relighted. (See Fig. 10.)

however, have been relieved somewhat in taking the photograph by the use of supplementary flood lighting as indicated by the luminaire shadows. Where this high ratio of brightness of important areas exists, there seems to be an effort by the eye to adapt itself to the differing conditions, which is obviously impossible. The results are several, including poorer vision and discomfort, which perhaps become progressively worse as the condition is continued and fatigue appears. Thus, a reduction of 40 per cent from an initial visual acuity (see Fig. 5) is reported over a period of 15 minutes, due to continued exposure to a large area of sky by subjects when performing a critical task—a brightness condition not obviously glaring when performing casual seeing.

And so it appears that such major variations in brightnesses must be avoided. Researches reported in technical journals and literature

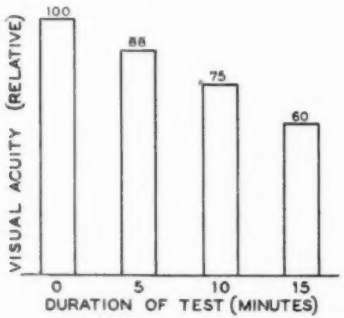

Fig. 5. Reduction of visual acuity due to continued exposure to a large area of sky when performing a critical task—a condition not obviously glaring when performing casual seeing. (From Light, Vision and Seeing, by Matthew Luckiesh, D. Van Nostrand Co., New York, 1944.)

have indicated optimum brightness ratios as high as 1 to 1. A study, by the committee, of conditions in well lighted and comfortable schoolrooms indicated the following practical and desirable values, for rooms used by faculty or pupils for critical seeing operations. (See Fig. 6.)

1. Between parts of the immediate central visual area, such as book and desk ..... 3 to 1
2. Between the task and the more remote parts in the general field of view, such as between book and ceiling, walls, or out-of-door objects ..... 10 to 1
3. Between the luminaire, or the sky if visible, and the ceiling or wall adjacent to it in the visual field ..... 20 to 1
4. In no case should the combination of these ratios be interpreted so as to permit more than a 20 to 1 ratio of brightness in any normal field of view

It should be noted that these brightness ratios are general in character—they do not apply to any particular type of lighting, except that light must be available from some place to cause any brightness. Methods of controlling both natural lighting and artificial lighting to obtain these conditions are discussed in the report on those subjects. The table of footcandle levels, indicating the levels to be provided irrespective of the source of light also is general in character. Incidentally, having explained the importance of controlling the brightness ratios in the field of vision, we might return now to the considerations prompting committee approval of the footcandle values as reported to you. Before we do this, perhaps you would be interested in the nature of this task committee. While some 27 people served on it at some time during its existence, the following 19 were members during the final preparation and approval of the proposed revision:

Fig. 6. A kindergarten in East Cleveland which presents a comfortable brightness pattern. The figures, however, represent brightness reading in footlamberts taken at night, although the illustration shows the daytime use with the row of luminaires nearest the windows not lighted. Luminaires are of plastic, designed for 750-watt lamps but equipped with 500-watt lamps.

Architects:
Lawrence B. Perkins, Chicago
Ernest L. Stouffer, University Architect, University of Illinois, Urbana

Board of Education Engineers:
J. M. Chorlton, Toronto, Ontario
A. J. Hoffman, Chicago

Consulting Engineers:
Romaine W. Myers, Oakland, Calif.
Foster K. Sampson, Los Angeles, Calif.

Electric Power Company Engineers:
John A. Harrington, Commonwealth Edison Company, Chicago
Charles N. Laupp, Wisconsin Electric Power Company, Milwaukee
George H. Seiter, Cincinnati Gas and Electric Company, Cincinnati
David P. Wood, Public Service Company of Northern Illinois, Maywood

Lamp Manufacturer Engineers:
Willard Allphin, Sylvania Electric Products, Inc., Salem, Mass.
Leonard V. James, General Electric Company, Chicago

Luminaire Manufacturer Engineers:
William V. C. Foulks, Curtis Lighting, Inc., Chicago
William H. Kahler, Westinghouse Corporation, Cleveland

Sight Conservation Bureau:
Mrs. Grace Hamman, Director, Honolulu, Hawaii

State Education Department:
Hans W. Schmidt, Supervisor School Building Service, Madison, Wis.

University Professors:
R. L. Biesele, Southern Methodist University, Dallas
Leland H. Brown, Stanford University, Calif.
R. C. Putnam, Case School of Applied Science, Cleveland

One consideration in the determination of the footcandle levels was: What is desirable, in keeping with similar general practice in other fields? Best office lighting practice ten years ago was in excess of 30 footcandles, while current good practice (see Fig. 7) is from 35 to 70 footcandles. The need for maximum quality production in factories during the war seems to be the reason for establishing current good practice there (see Fig. 8), for departments requiring critical seeing, of upwards of 35 footcandles, with some local lighting requirements in the hundreds of footcandles. The significant thing about these office and factory levels is that the expense for them is a production expense, and hardheaded business men would hardly continue such lighting unless they were convinced that it is sufficiently beneficial to be profitable. The question was asked by members: Are our children not entitled to equal benefits?

Considering laboratory research proof of the value of such levels, reference is made to a most interesting report by R. J. Lythgoe, an English Doctor of Science and also an M.D., on "The Measurement of Visual Acuity" (*Medical Research Council Report* No. 173, H.M. Stationery Office, London, 1932). (See Fig. 9.) The part in which we are interested shows the improvement in visual acuity with an increase in

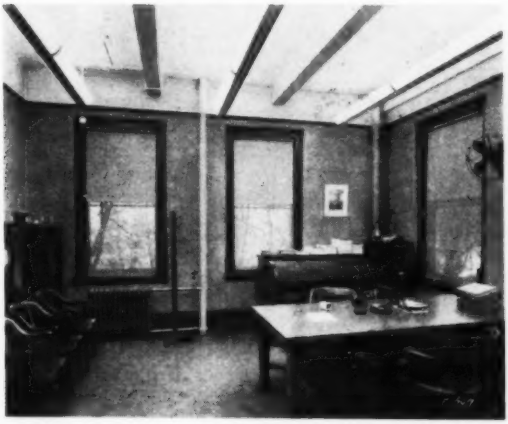

Fig. 7. An office that is well lighted with fluorescent equipment.

brightness of the task. The lower curve shows this increase where the background surrounding the task is completely dark, with the acuity increasing until the task has about 17 footlamberts brightness and then falling sharply away. A reading task of 75 per cent average reflectance would have 17 footlamberts of brightness when illuminated to about 23 footcandles. This level therefore provides optimum performance for this condition. But the black surrounds seems to have a marked effect on this operation.

The middle curve shows the increase in acuity where the surrounds have a brightness of .011 footlambert, about the brightness which would prevail in a classroom lighted to full moonlight. Here the acuity increases until the task brightness is about 50 footlamberts (67 footcandles on the assumed reading task) and then falls off slowly.

Fig. 8. A combination of general lighting (about 50 footcandles) with local lighting superimposed at the task (about 250 footcandles).

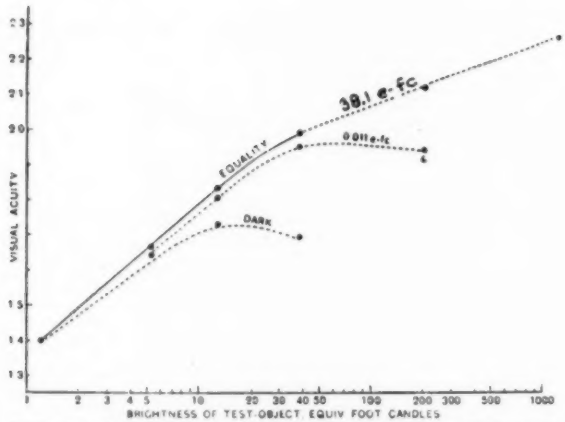

Fig. 9. Increasing visual acuity due to increasing footlamberts brightness of the task. Top curve is for equal brightness of surrounds and task for the full-line curve and with 38.1 footlamberts brightness of surrounds for all points on the broken-line curve. Bottom curves are for low brightness of surrounds or for no brightness, as indicated. (From R. J. Lythgoe, "The Measurement of Visual Acuity," Medical Research Council Report, No. 173, H. M. Stationery Office, London, 1932.)

The top curve is for a condition where the surrounds have the same brightness as that of the task until they reach 38.1 footlamberts—about the brightness which would prevail in a classroom lighted to 75 footcandles—and then the surrounding brightness being held constant at that value. The increase in acuity is more marked from the start and, under these favorable conditions as to surround brightness, it continues to increase to the limit of the research—some 1,200 footlamberts, which would be 1,600 footcandles on the printed page.

The significance of the visual acuity values on the curve is seen when we realize that a detail 1/8″ wide on a chart at a distance of 35′ requires a visual acuity of 1 to be seen. For the greater visual acuity of 2, the detail would be 1/16″ and for 2.3 it would be 1/8″.

These data indicate that under some conditions, at least, a level of hundreds of footcandles might be preferred, from a strict visual acuity standpoint.

Reverting to actual school conditions, a research by Dr. M. Luckiesh was noted. The visibility of a reading task of 8-point Bodoni type at 14″, viewed through a clouded filter, was reduced to threshold by lowering the level of illumination on the page; the footcandles then noted are indicated in Table I as 100 per cent for reference purposes (8-point Bodoni type is slightly smaller than that in the *Saturday Evening Post*). Then, using the same filter and observers, other tasks were placed at the same distance, except where noted, and the illumination level again varied until the same visibility was obtained. The range of values of illumination for equal visibility of school tasks was found to be about 100 to 1, which must be disconcerting to anyone who attempts to prove that any single value of footcandles is just right for school purposes.

TABLE I. RELATIVE ILLUMINATION NEEDED FOR TASKS OF VARYING DIFFICULTY

Tasks	Relative Footcandles
8-point Bodoni type (used as reference)	100%
12-point Bodoni type	50
Good writing on chalkboard (6 feet from board)	100
6-point Bodoni type	170
Own handwriting in pencil	200
Newspaper text (average)	300
Bookkeeping	350
Drafting	400
Shorthand notes	600
Good writing on chalkboard (22 feet from board)	700
White thread on white crepe cloth	1,000
Steel scale, 1/64 inch divisions	1,800
Black thread on dark cloth	4,250

Another consideration was what level of lighting is structurally attainable, with shielded sources, so as to have good quality lighting without so high a wattage as to create undue heating. This is construed as 6 watts per square foot for the normal classroom, with other rooms in natural proportion. Six watts per square foot with indirect incandescent luminaries (see Fig. 10) of high efficiency and in a well-appointed room should deliver, maintained in service, from 25 to 30 footcandles. Thirty footcandles from 6 watts per square foot are definitely possible if care is

Fig. 10. The room shown in Fig. 4 after being redecorated and lighted with six 750-watt lamps in indirect luminaires.

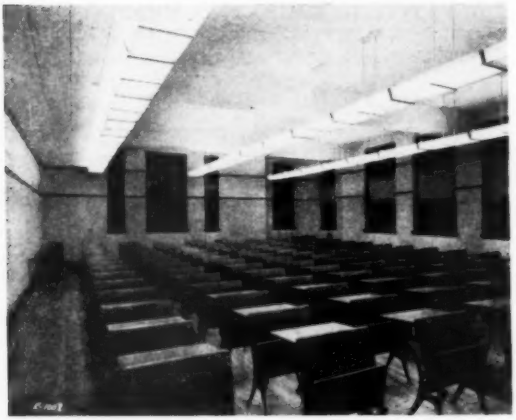

Fig. 11. A study hall with three continuous rows of U.R.C. units, each of which is equipped with four 40-watt fluorescent lamps, furnishing an average of over 50 footcandles. The inside row is surface mounted on a lowered portion of ceiling—the other two rows are suspended.

taken in selecting and maintaining the luminaires. This figure is the "after" picture of the room shown earlier. With suitable fluorescent equipment (see Fig. 11), about twice these values are available. For a time the committee was seriously considering a base level of 40 footcandles for the classroom and were being branded as pro-fluorescent because of this. My retort was that perhaps our critics were pro-incandescent.

The economic consideration was also analyzed and, while such comparisons could hardly be incorporated into the report, it has been found that 30 footcandles of incandescent lighting could be provided if the families represented by pupils in the room would remain away from the movies three or four times during the year and give this money to the school board. This amount would cover not only the operating expense for energy, lamp replacement, and cleaning, but also 10 per cent of the complete first cost each year, so the installation could be replaced in 10 years. Again about double the footcandle value could be obtained with fluorescent equipment for the same total expense, including amortization of the high first cost.

After months of studying and arguing, the committee stood 13 to 6 for a 40-footcandle base for the standard classroom, and I venture to say that most, if not all, in this room would have agreed after the same amount of consideration. Most of the six would recommend 40 footcandles in their own practice, but felt we should not endeavor to commit the members of the Illuminating Engineering Society to a value they might not be prepared to support wholeheartedly. This idea finally prevailed, 30 footcandles ultimately being approved by unanimous vote.

So much time has been devoted to these matters of desirable footcandle levels and footlambert brightnesses because they are basic to the latest thinking in connection with modern school lighting. The requirements can be satisfied with high-efficiency, low-brightness luminaires, in rooms with very light ceilings, and upper side walls and fairly light lower walls, floors, and desks, the wattage depending upon the type of lamps used and the actual luminaire efficiency and room reflectances.

Natural Lighting

The entire time assigned to modern school lighting today might well be given to the discussion of natural lighting. The variable availability of good daylight, by season and by location, is noted, as well as the difficulty in getting window light to the rear of the room. The point here is that the window itself is not the source of light, but rather the sky or other areas beyond it, and much more of these areas can be seen, and therefore have influence, at the seats near the windows than at those far removed. The matter of window placement, size, and design is considered, with helpful sketches. It is pointed out that the age-old proportions between window and room dimensions do not have the same importance in rooms with special fenestration and modern artificial lighting arrangements. Bilateral lighting using clerestory windows on one side, and securing additional light at the rear of the room from set-back clerestory windows, are suggested. The possible use of exterior controls in the form of baffles, outriggers, venetian awnings, and jalousies is covered.

For inside control, the double shades, supported at the center of the window opening, are given proper consideration. The question of using venetian blinds may serve to illustrate how the committee resolved their differences of opinion. A short paragraph, noting the fine possibilities of venetian blinds for control of light, but emphasizing the need for maintenance and for frequent teacher adjustment, was sent out for committee comment. One member with much unpleasant practical experience, in replying, asked that the matter of venetian blinds be omitted entirely. Another member urged that the paragraph be greatly expanded, singing the praises of this form of control. A final mutually satisfactory compromise was adopted, which represented the composite idea of all 19 committee members, and which all members could support.

When this report is printed, I suggest you study the chapter on natural lighting, prepared by or under the supervision of Lawrence Perkins, and, if you can think of anything important which has been omitted, just drop Larry Perkins a line. We cannot cover all points here and I do not think his secretary will be burdened with the mail I have invited for him.

Artificial Lighting

In addition to the excellent descriptions of the types of lighting systems available and their application in the numerous rooms found in a modern school building, the discussion of artificial lighting has two particularly important features. One is about luminaire brightnesses

and selection. In keeping with the present greater understanding of the significance of brightness, the limitation as applied to luminaires is, on its face, rather drastic. In an angle of 30 degrees below horizontal, it is limited to 225 footlamberts, or about one-half candle per square inch. In the next 15 degrees, 450 footlamberts, or one candle per square inch is permitted, while in the lower 45 degrees, seldom seen by those

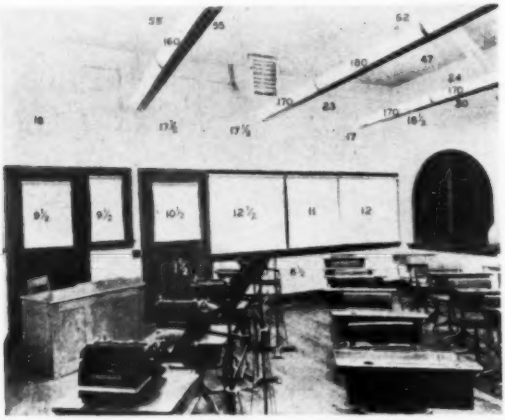

Fig. 12. Classroom in the Oak Park-River Forest High School. About 50 footcandles. Ceiling flat white down to chalkboard. Light shades over chalkboard. Lighting equipment—luminous indirect, employing 100-watt fluorescent lamps. Total watts per sq. ft., about 4.5.

Fig. 13. A "before" picture in Oxford School, Cleveland Heights, Ohio. Ceiling off-white, reflectance 65%; walls tan, reflectance 40%. About 6 footcandles average.

Fig. 14. A similar room in Oxford School, after modernizing. White acoustical ceiling, reflectance 75%; light green walls, 62%; darker green wood trim and doors, 35%; desks refinished natural non-specular, 45%. Well louvered direct-indirect fluorescent lighting. Average footcandles at desks after seven weeks use, 58; on front chalkboard, 26; and on side chalkboard, 35. Total watts per sq. ft., about 2.7. Excellent installation.

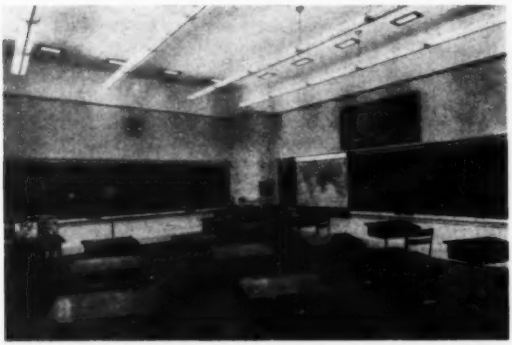

Fig. 15. A sight-saving classroom at Poughkeepsie. Actually floor and desk tops are light in color. Chalkboard green etched glass, increasing reflectance and harmonizing with light green wood trim and walls to picture mold (flat white above). 50 footcandles from luminous indirect fluorescent, supplemented at board with local lighting. Total watts per sq. ft. about 3.3.

in the room because of brow protection, 1,000 footlamberts, or slightly over two candles per square inch, is permitted. These low values are such that they will assure comfortable lighting conditions (so far as the luminaire brightness is concerned) in almost any reasonably planned room. Where, however, illumination levels and room decoration are in

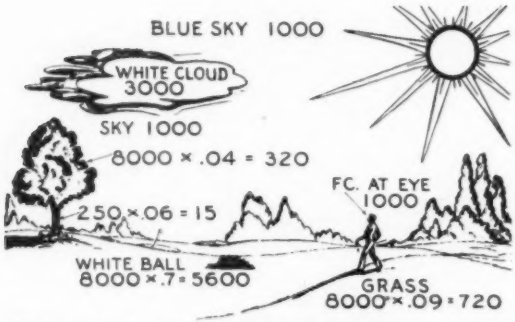

Fig. 16. Brightness ratios in nature. Note the large objects in visual field: blue sky, 1000 footlamberts; white cloud, 3000; grass, 720. The absence of substantial variation here indicates comfort. Sun is very bright but players avoid direct eye exposure to it. Smaller objects may be higher or lower without introducing discomfort.

line with the requirements set in this standard, approximately double these values would be permitted. Under these circumstances the better shielded-lamp fluorescent fixtures can be used, and many of the newer luminaires being planned by manufacturers will qualify.

The other feature is a table which gives the range of footcandle levels which can be expected to result, maintained in service, from installations of various numbers of indicated lamps in specified types of luminaires in a standard classroom. A range of such values is necessary because of a range in distribution of light from the luminaires in any given class and a range in their efficiencies. Given these characteristics by the manufacturers as well as the variations from the described standard room, it will be a simple matter to interpolate and ascertain quite closely what the footcandles will be. The table is accompanied by a series of floor plans, indicating how the different groups of luminaires may be arranged.

Economic Factors

The discussion of economic factors of school lighting and the explanatory appendix accompanying it emphasize two matters (1) cost calculations and comparisons, and (2) maintenance. A form is given as a guide to the calculation of the complete cost of the lighting, including amortization of first cost and annual expense for energy, lamp renewals, cleaning and repair, with suggestions as to evaluating this cost of light as a part of the cost of education.

With reference to maintenance, in addition to maintenance suggestions, it is emphasized that poor maintenance may be the most expensive. If eight luminaires would provide the desired illumination with good maintenance while ten would be required with poor maintenance, the 25 per cent extra cost of amortization, energy, lamps, and even cleaning itself, due to the two additional luminaires, should be added to the direct expense for the poor maintenance in making the comparison. Organization for regular cleaning is therefore indicated.

Wiring

The section on wiring is a very practical discussion of this important subject, not as a substitute for the National Electric Code and similar publications but to indicate the application of these principles to school house construction, both new and remodeled.

Installations

In closing, I would like to show a few photographs of schoolrooms, not to indicate all the types of equipment and their arrangement which can be used, but to illustrate some of the principles which have been discussed. (See Figs. 12-15.) An interesting set of brightness values has been observed on a golf course. (See Fig. 16.)

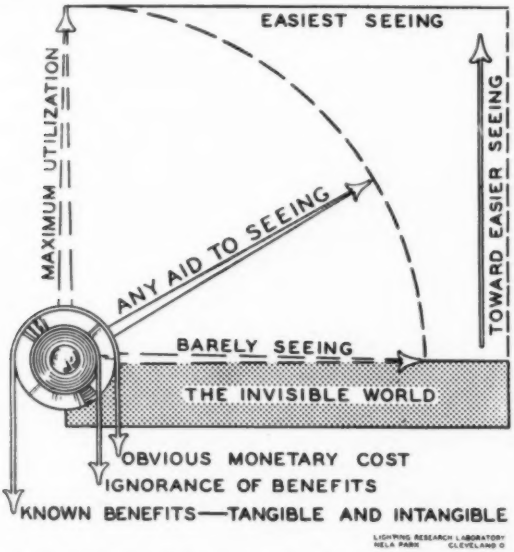

Fig. 17. A practical utilization of any aid to seeing will balance the benefits to be derived against the effort or cost of securing the portion of aid provided. Failure to understand value of benefits which might result from favorable over-all seeing conditions may be as definite a deterrent as cost. (From Light, Vision and Seeing, by Matthew Luckiesh, D. Van Nostrand Co., New York, 1944.)

And so we come back to the economic limitation (see Fig. 17) which suggests the questions: "What proportionate part of education cost should be budgeted for lighting, and what approach toward the ideal is practical on this basis?" The school authority is the only one who can give the answer to this question.

Unfortunately, there is no positive knowledge today as to exactly what lighting is really the best for schools. Standards of today are higher than they used to be because of a better understanding of the subject, improved equipment, and the lower relative unit cost of the lighting. There is every indication that considerably higher standards than the best in use at present are desirable, and will be used in the future as equipment is further improved and the relative cost decreases. Perhaps it is well we do not now have irrefutable knowledge on what lighting is best for seeing—we might be unhappy over what part of it we can afford.

LOOKING AHEAD IN SCHOOL BUILDING PLANNING AND CONSTRUCTION

PANEL DISCUSSION

AT the Friday evening meeting of the conference, a panel discussion was held under the leadership of Lawrence B. Perkins. Participating in this discussion were E. T. Peterson, W. F. Clapp, John E. Nichols, Paul W. Seagers, and Harold E. Moore, each of whom added his comments on the subject of future school building planning and construction and on the various issues brought up during the meeting. The highlights of this discussion follow:

Mr. PERKINS: I spent last night with the School Board telling them that there is a very strong rumor running these days that buildings cost a great deal of money, roughly 200 per cent of what they cost before the war. What do you think that is going to do to the number of school buildings that will be erected, the rate at which they can be built, the architecture that will be built?

Mr. MOORE: We are not going to have, proportionately at least, more money than we have now. We may catch up a little on costs by having a larger tax pay; but, proportionately, we probably won't do much in overcoming the losses that we have experienced over the last few years. Whatever is done to meet the problem will have to be done by our ingenuity and modification in program plans to some extent, if the program is not to suffer. A partial solution is the initiation of a degree of research in the school building field never before undertaken or experienced. School building anyway is a matter of research. We start out by finding needs and then search for an architect who can do the job. It is all a problem of research. If we do a better job of finding our needs there will be less waste. We can do a better job of planning, and building, and of utilizing materials. We can close the gap between resources and needs in many ways other than by just lopping off so many rooms or so many stated facilities. Of course I appreciate the fact that this is easier said than done.

I want to reiterate what I said once before today, that we didn't get in the shape we are in, as far as school buildings are concerned, in the last five years. It has taken 25 to 30 years to get to this problem period, and it is going to take a while to get out of it. It is going to take time, more time than most of us have patience to endure. Also I am convinced that we will need to do some remodeling in buildings—remodeling that we did not anticipate doing when we were still hoping there would be a lot of new materials after the war, with which to create a new world in building.

Mr. PERKINS: Do you want this group to believe that prices of building will be up, down, or the same as they are now?

Mr. MOORE: Maybe it is wishful thinking, but I take the point of view that we should avoid building now if possible; however, if prices do not fall immediately, we will have to build much in the next three to seven years. At least we should have a greater supply of materials from which to choose, and a greater likelihood of completing a building. I don't think that I would encourage anyone to think prices are going to revert to where they were. I don't harbor any such notion.

Mr. PERKINS: Dean Peterson, have you anything to add to this part of the discussion?

Mr. PETERSON: It seems to me there are two phases to the question. Maybe we should pay more attention to what to do about this immediate problem we are up against. Our main concern is to delay, except in emergency situations where some construction simply must be done. Following a lead or two I noticed this morning, I think we need to be paying much more attention to the long-term problem in the sense of recognizing what I think is inevitable: that public education is going to have to take on increasing responsibilities, and that we must, through our own channels of contact, convince our public of the desirability for the school to undertake many of the activities which we now are trying to encourage through the family as a unit, through other social institutions, or through private enterprise in a sense of commercial recognition.

I dont know how much money has been poured into new taverns, new roadhouses, new juke box joints. You could cite any section of the Middle West; there seems to be money available for that kind of building. I am suggesting that, as a long-term social issue, we have to socialize many of our activities. As a people we can't afford to turn these problems over to private enterprise to solve. I pay my respects to Hollywood. Hollywood is hopeless; Hollywood is going to get worse, not better. We have to build a new sensitivity to the needs of public education. I suggest that, when we get that done, we are going to see a willingness to invest in public education, at a much higher level. But for now we must get our patrons to look at public education as being completely socialized. As we probe into these other areas of activity, it will mean a more constructive use of increasing amounts of leisure time.

It is a matter of broad social policy and not a matter for individuals or very small groups of individuals. I realize that this is no help in terms of the immediate situation; that is, in terms of what can be done in the next two, three, or four years.

Mr. PERKINS: In your peering into the future, do you think the limit of this country to pay for such education as it decides it wants is low? You cited that we can pay for taverns.

Mr. PETERSON: In the sense of economic ability, I would say that we could treble our expenditures without putting a strain on some of our revenue systems. And certainly a good part of the issue is psychological. As a nation, according to the Collector of Internal Revenue, we have been perfectly willing and anxious to spend on liquor this last year something like 150 per cent as much as on our present educational

system. What an investment in this respect the people are making today! Our problem is to help create a new perspective, a new schedule of values, and, as our patrons begin to see some of their immediate problems in dealing with their own youngsters and with the neighbor's kids and the kids across the street, they are going to be more anxious, more concerned about these issues; they are going to be more and more interested and more willing to finance our efforts. I must admit I am more interested in the long-term problem than in how to solve the immediate problem.

Mr. MOORE: Do you think that the upward trend in teachers' salaries in some states may also be reflected in an upward trend in expenses for maintenance and operation?

Mr. PETERSON: Yes, some. A very central point in Nichols' talk this afternoon centered around the concern that, in this compulsion to get started, we are apt to strip our plans for construction. That isn't what we need to do. If we are going to enlarge our programs, we cannot assume these new responsibilities by stripping our plans. We cannot afford to cut our facilities by stripping our equipment. That would be the most stupid kind of response to this long-term problem. Too many of the plans I have seen were apparently modified by the immediate financial situation. I have looked at too many elementary situations that are still sticking to the old 22′ x 30′ classroom. It is time we kicked that out of the window. Unless we radically change our ideas, it is no longer possible to operate in a classroom of 22′ x 30′. All that that gives us is a place to put the kids provided they sit still. If they start moving, we are in trouble. You still sell many sizes of the old screw-down pedestal desk, don't you? (question addressed to Mr. Snow, representative of a desk firm).

Mr. SNOW: Yes, sir, some.

Mr. PETERSON: We ought to get people to quit buying them.

Mr. PERKINS: Moore and Peterson have both given a rather strong implication that the country hasn't been laid over a barrel and cropped so thoroughly that buildings need be limited in size and design by lack of financial resources. We apparently still have the strength to do what we choose. Mr. Clapp, what do you think?

Mr. CLAPP: I entirely agree with Peterson in taking a long view, and I am inclined to agree with him that we have ample resources to build all the school buildings we need and to put in the kind of buildings we ought to have. There is certainly adequate wealth in the United States to provide good education and good housing for children. I think the financing of our school building is based on an archaic system of raising revenue, a system which we have exhausted already in the operation of schools. I mean by that the real estate tax. I think it is no longer just and fair in our present economy to depend entirely upon real estate for the financing of school building any more than it is just and fair to depend on it for the operation of our schools. In the present decentralization of educational opportunities, the places which need the education the most find the real estate tax entirely in-

sufficient because of low assessment values. So I maintain that we have to have some other system of financing school building.

I recognize that there may be some evils connected with it, but I believe we have to devise an equitable system of state aid for school buildings just as we have state aid for salaries and operation. Florida has been working on a scheme, and I understand the last legislature passed a measure by means of which each school district receives a certain amount of state money per child for capital outlay. It may use the money immediately to build a building, it may save it up in a building fund for future use, or it may use it to pay for an existing building. But every district in the state receives from the state a certain amount of money each year for capital outlay. I think the bill is amended so that the local real estate taxes do not enter into the picture. Obviously, a district that has a high evaluation of property needs very little state aid. We are playing with the idea in Michigan, but we haven't gotten very far with it. But I think it is coming, and it may be one solution to these rising costs. I don't think it is any immediate solution for the present inflated costs.

Mr. PERKINS: I once attended a meeting of Cornell's alumni, of which I am a member, and it was very interesting. The subject for the consideration of the alumni was the purchase of the new engineering building. I surmised that they were going to "put the bee on" some of the P.G.'s, and it was very important that they should "just love it." The meeting was divided between the engineers and the Cornell architects present. Since then I have gotten to expect people to be out of character—the engineers were the aesthetically-minded members of the group and the architects were the practical ones. Now I am going to throw this question at the architect present, who will, I hope, show great courage in answering—a question which he has no business trying—a question about educational philosophy. Nichols, what do you think is the basic effect on school building planning of the changing educational philosophy? First of all, what does educational philosophy mean in terms of a child going from here to there and doing what? And what does it mean to an architect when he starts laying out floor plans? Is it something an educator hides, or does he know what he wants?

Mr. NICHOLS: I hope none of you will take offense, but I sometimes wonder if we don't hide behind a great many words when we talk about educational philosophy. However, there are certain trends which we, as superintendents of schools and as architects who are building and designing school buildings, must recognize—trends which I don't think are normal at all. They are long-term trends. When we design a building today we are wrong if we don't take those trends into account. All of us have buildings, which we damn, because 25 years ago the superintendent of schools and educational authorities and architect had no conception of the developments that were to take place in the 25 years. And so it will be with us in the future. There certainly are developments in education that will continue to exist, some of which are probably obvious to us all.

The first is the tendency to help children to learn by giving them an opportunity to put into practice that which they are learning. This has brought about a completely new idea of the design of classrooms for both elementary and high schools. Architects generally are trying to get away from the old 22′ x 30′ classrooms. In such rooms we cannot put into operation the sort of program to which we all give lip service, at least, because we don't have the physical means to do it.

The second trend is away from departmental treatment of subject matter in our high school—and it might apply in some of our elementary schools, too—where we teach English in classroom 305 and forget it completely in classroom 308. We teach math in a certain specified room, but never in the shop. And so it goes on down through the high school program, and very often through the elementary school program as well.

If we were to start doing a thorough-going job of the integration of learning, I, for one, wonder what the effect would be on the plan for the school. There is the little question, for example, of health and physical education. It may be a touchy point from the remarks I have heard. Too often physical education in our schools is nothing but glorified athletics, and those who need it never get a chance. Their only opportunity for participation is to admire the team and to give them support. That does not afford a desirable opportunity for physical education in any school. Certainly the whole question of health, from preventive medicine to the correction of physical defects, is all a part of the school health and physical education program. These features should be integrated with what goes on in the gymnasium, and if we do that job it will again have a tremendous effect on our gyms, which are now designed around basketball.

Educators everywhere complain because the school day is not long enough to do the job they are supposed to do. And they are probably right. When we talk about the value of extracurricular activities in our school, we certainly aren't getting very far when we adopt the policy of turning the children loose at 1:30 or 2, as they do in some places. I think there will be a trend toward a longer school day, with the emphasis not on Latin, math, etc., as such, but on learning trades or skills in our schools outside of the classroom.

I am reminded of a situation concerning a superintendent I know in Massachusetts, who is tackling the problem of lengthening the school day. In the East, where there are labor unions, and where attempts have been made to lengthen the school day, several superintendents have had strikes. But this superintendent is sneaking up on the pupils; he is increasing the school day five minutes each year.

There is the whole problem of high school education and elementary education. During the war we have seen the development of nursery school programs and kindergarten programs. I don't think that as yet we have seen the end of such problems. We have demonstrated the value of nursery school programs and kindergarten programs, and I am not talking here about taking the children off the hands of mothers who want to play bridge. The development of nursery schools is a problem which education authorities will have to meet, and our school buildings will have to be designed so that we can tackle that problem.

As the war years get farther behind us and our boys and girls at 18 can't find jobs, they are going to stay in high school if we have in our high schools something for them that is worth-while. If that be true, we will have to provide the facilities in our high schools to make that possible. This might be linked up with the whole question of vocational education. The surface has been scratched, but we are going to see more emphasis on vocational education, not as something completely apart from education generally, but as something that is tied up closely with education. We are not going to teach a boy to be a bricklayer, but we are going to teach him the elements of mechanics. We are going to give him a broader knowledge, so as to equip him better to choose his livelihood and to vote intelligently.

I haven't answered a thing, of course. These are some of the problems, I think. Maybe some of the others here will have ideas on these problems, too.

Mr. PETERSON: Now I want you to get this straight. This fellow Nichols is masquerading on this program as an architect. It should be pointed out that he was in charge of the School Planning Division in the Connecticut State Department of Education. Nichols, in my judgment, more than any person in the entire field, has had the opportunity to look at both ends of it very closely. That is why you get such a sharp analysis.

Mr. PERKINS: I can speak for the other side of the tracks; he is quite highly respected by the architects. Wouldn't you like to carry on the philosophy and the uses to which the school will be put which affect physical planning, Paul?

Mr. SEAGERS: All right, Larry. I think very few schools in the past have been built because of somebody's philosophy. That is a pretty stiff statement to make here, but I am going to make it anyway. I think we have been building schools from the outside in instead of from the inside out. It is time to build schools from the inside out, after determining first what is going to take place inside those schools, instead of building a beautiful edifice and then letting that edifice determine the school program. We have to go back to something fundamental.

One of the problems is that of cooperative planning, first to determine the philosophy, then to design in terms of that philosophy. The other is a very closely connected problem, that of the community center school. You can tie it up in two bundles, the community *center* school, which is the plan, and the community *centered* school, which is building the community into that plan. I am going to go through briefly a few of the things I have noted here. One hasn't been touched upon, therefore I'll extend my remarks on that particular point.

Today we think in terms of pupils rushing here and there. They rush in in the morning and sit down when the bell rings. They stay 40 minutes, have two minutes to get to the other end of the building, and then another bell rings. They sit down and roll is taken. In 40 minutes more, another bell rings. We have buildings with poor acoustics; we have buildings with bells that just knock you right out of your

seats; and, as some of you know, we have buildings which need redecorated walls. I mean walls with no designs, no color—walls which are dim and dark—we could speak of them as dungeons. It is time we took care of this situation, so that there would be a certain restfulness in the wall coloring. We have to have proper light.

Another important thing is proper relaxation. We have been driving these boys and girls from one end of the building to the other. Then we set up activities, and we think an activity should be something they can do, such as modeling something, or kicking a ball. I want to suggest to you that we have to think more of the rest and relaxation side of this whole program. The first thing you know we are going to have more people in the insane asylum than we have now, and we have a pretty big number now. So, in thinking of setting up a philosophy, let us take into consideration this whole question of nervous strain, rest, and relaxation.

Now, the problem of the community center school. We have been using schools for about 40 hours a week and then we close them up. They are closed on Saturday; they are closed evenings. In many cases they are closed in the summer. We can't afford to do that. I think it is entirely unethical to use our schools the way we do today. We can't expect to get the schools that we need if we are not more democratic in planning. We should bring the people in on the plans—pupils, parents, and teachers—we should tap all community resources. This is the way we can develop this philosophy.

I know of one school which has set up a manual, to help boards of education on this problem, entitled *A Problem Confronting Boards of Education.* The board of education appoints committees. One committee tries to figure out what the community will look like five years from today, ten years from today. Another tries to figure out the type of education that the school will want five years from now, ten years from now. Another takes a glance at the education at the present time in that school district. The fourth committee tries to figure out how to get from here to there.

Bringing the community into the schools is a problem for the community. When these committees know what they have, when they see what is ahead, and when they are able to determine how they want to get it, I know they are going to support the schools. I have seen definite evidences of it. They are going to determine a philosophy that is a philosophy. What's ahead? What do you want and how are you going to get there? Practical, very practical. That means building a school for the community to be used by the community.

You have heard what Dr. Peterson has been talking about today. I subscribe to that very definitely. In some cases that means assembling or associating some rooms. It may mean bringing your auditorium, gymnasium, and cafeteria into a group so that they can be used for community purposes. It may mean relocating the shops so that the public can get to them nights, summers, and other times without chasing through the rest of the building. It may mean isolating or relocating the homemaking suite. It may mean building a swimming pool attached to the building, rather than inside the building, where the type of wall

or windows allows them to be opened up for summertime use. There is no limit to the ideas. It may mean building a terrace like the terrace out here on this building; or a loading platform so that band concerts can take place in the summertime, or that pavement dances can be given for boys and girls, thus keeping them from roadhouses and other undesirable places. It may mean outdoor summer movies. It may mean a new type of room—a junior room that can be used for canteen work, junior canteen work, or coca cola parties, to keep young people away from these other places. It may mean a new conception of the library, including listening rooms, previewing rooms, storage rooms for audio-visual education material—making the library the nerve center of the school. It may be desirable to relocate the room, so that the public can get to it without chasing through the building too much. There are a good many ideas on this subject relative to the development of the new type community center school.

But the new type community center school is not going to do you any good unless you make it community centered. That means bring the community in. And if we make it community centered, I don't fear about support from the community. People are going to want their schools, and they are going to want them badly enough to pay for them. There is definite evidence of that in case after case.

Mr. PERKINS: Thanks very much. Of course, a lot of superintendents have tried cooperative planning, Paul, and have not been too successful. I suspect it has been because of techniques. Over and over again superintendents have attempted a democratic approach to the problem. They have honestly wanted to plan a building which their science teachers and their shop teachers would prefer, a building that would receive the support of community organizations of one kind or another, the Boy Scout and Girl Scout leaders and their parents, garden clubs, the historical societies, and what have you. They have attempted to build individual and group preferences into the plan by submitting the problem to those involved. One group would study the needs of the science unit, one group homemaking, and so on down the line. And the Boy Scouts and Girl Scouts would get together and define their needs. The needs of all are brought together into the superintendent's hands and they are transmitted to the architect. Then when the architect gets them and puts them all together, he has a building which is at least three times as large as the community could possibly build even in the boom days when we had money. And of course, he starts in cutting. And the person, or teacher, or group whose ideas apparently have been spurned goes through the building and finds that all the things they wanted just aren't there. What are the techniques for getting these groups together to define their needs and still accept the limitations which they must accept? That is a tough problem.

Mr. SEAGERS: It is a tough one. You can fall into many traps, you can get many people angry at you if you don't watch out. We have discovered that there are definite techniques you must follow. In the first place, when we deal with these groups we are dealing with people who certainly don't now anything about buildings, isn't that right? That is the first thing.

The second is that we are dealing with several different groups of people, of different age levels, who think differently and look at this thing from different points of view. The teachers want to use it, the children want to be in it, and the parents pay for it.

In the first place, they have to have something to judge buildings by. They can't plan buildings or work on plans of buildings unless they know what good buildings are. In our own case, all we did was to find a good building or two for comparison. We took buses to see buildings 150 miles away; that was quite a stretch. Pupils, parents, and teachers went. The parents and pupils were selected in the home-rooms by the pupils themselves. That is where your democratic administration came in. No person wants to try this unless he believes in it; he can't go into it half-heartedly. When people actually see other schools, they see many good features and bad features. Then the thing to do is to sit down and talk with them. I talked with the teachers first, because they were closer to the picture so far as philosophy was concerned. Then we brought in the pupils and talked to them, and then the parents. We systematized what we would like to have in the school plan. The architect was then brought in, and, of course we had to consider building regulations that determine the over-all size of the building.

One of the things we had to drive home to all these people was the place of the expert in this whole business of planning, the fact that these people came in only in an advisory capacity, and the fact that there were many experts whose opinions had likewise to be respected. The school man, the architect, and the engineer are supposed to be experts in their fields. We brought them all in, and asked them to explain how things functioned in this whole matter of planning.

Well, to make this long story short, we finally divided up into committees: one committee on community use of the building, another committee on social studies, another committee on health, another committee on shop, agriculture, homemaking, etc. We didn't use all of them finally, but we started in with 21 committees. There were pupils, parents, and teachers on every single committee. They went off by themselves and started pondering the problems. The architect tentatively gave them space allotments. They had a certain amount of space to plan on. From there on they worked in the development of that space. We did get some variation in room size, not as much as I would like to have had, because we wanted to cut down some of the cost by using interchangeable forms. The boys and girls came out with some very good ideas, and the teachers came out with a lot of good ideas. I gave them a questionnaire later on to determine whether they enjoyed it; whether they thought they contributed. About 50 per cent didn't think they contributed much, but they thought they got a lot out of it. They developed an attitude toward better care of the present building; and certainly the public was aroused for the support of the school.

Mr. PERKINS: Several years ago an article was published which recited how Carleton Washburne had handled this particular point. I happened to have been working on this project, and I remember the

situation. Every teacher in that particular system knew for sure that she wanted a bay window, a place for gathering somewhere in the classroom, a little focal point for the story corner. Every teacher in that system, with equanimity and clarity of purpose, wanted a classroom which was just under 12 acres per room. In fairness, that is a slight exaggeration. However, when it finally got down to brass tacks, the budget was maintained in Carleton Washburne's hands without the slightest deviation, although he had to bring in architects to explain that they couldn't have certain things they wanted, such as cabinet spaces, if they were to have large classrooms. The optional dimensions of the rooms were set up as 24′ x 34′ without a bay window, or 24′ x 30′ with a bay window, the cost being the same. That is the way to stop insurrection before it starts. It was their decision. Do you want a bay window or a big room? You can't have both. It was their own decision to make, and it worked.

As we were riding back to town this afternoon and talking automobiles, we agreed that the people who design automobiles are not the designers in South Bend and Detroit and elsewhere, but the people who purchase them. Similarly, architects who work on school buildings may think they design schools, but they, too, have not yet been enlightened. It is the customer who finally sets the trends. Therefore, in line with the policy of this meeting, which is to give questions strictly out of the professional field to the members of this panel, I should like to put before you this particular one: What would you like to see in the way of technical physical improvements in school planning? This is for you, sir [to Mr. Clapp]. What do you believe are some of the physical means by which better, more usable structures can be built around the philosophy of education?

Mr. CLAPP: I am not an architect or an engineer. I am just a school teacher who has an interest in school building. I have a notion that we have been building buildings and designing buildings too much from the point of view of adults, who often think of new buildings in terms of community pride or with a view to matching community architecture. I think we perhaps ought to begin to design buildings that appear inviting to children and that are planned in such a way as to make it possible for teachers to work with children in informal sessions. I would like to use a personal reference here if you don't mind. While I was working for the federal government during the war, I lived for a year in Winnetka, where the school was designed by Larry and Carleton Washburne and the teachers. When we first went there, I decided to take the family around the town and show them the kind of place they were going to live in. Naturally, one of the show places of the town was the school. My young son was acquainted with a certain school building in Lansing, where his sister had gone, but he had no interest in it whatever. Yet, when we drove by that particular school in Winnetka, without any solicitation or prompting, he said, "I would like to go to school there." Now that building has only one story, it is sprawled out, it is on a large site. It doesn't look like a school, but the building was attractive to a child.

Something was said this afternoon about the fact that we have not adapted mass production techniques to school buildings, intimating that, if we did do that, we would start making buildings all alike. I certainly don't want to adopt mass production techniques. I would like to have somebody take hold of it who knew something about it in the way of designing our buildings, first, to meet the demands for individualized instruction, and second, to meet the demands for reasonably priced construction.

At this point, Mr. Clapp went to the blackboard and roughly sketched some plans for elementary units. These plans illustrated methods of getting more flexibility and more light into elementary units. Departure from traditional design consisted of grouping smaller units into a coordinated whole, rather than having one large building which would incorporate all units. Another point stressed was the desirability of decentralizing the heating facilities.

During the few minutes of remaining time, a spirited question and answer session on various points in the panel discussion was carried on, with the audience participating.

THE RELATION OF THE ARCHITECT TO THE EDUCATIONAL AUTHORITIES

(A Condensation)

by

JOHN E. NICHOLS

IN approaching the topic assigned to me this morning, I propose to confine my remarks to the most prosaic and practical aspects of professional relations between architects and the educational authorities engaging their services. Although much of what I have to say may appear obvious, a considerable experience in working with school building committees and boards of education reveals an astonishing ignorance or thoughtless disregard of the principles that should prevail.

What I have to say is predicated upon the conviction that a school building exercises a greater measure of control over education than any other single element, and therefore is perhaps the most important. Superintendents, principals, teachers, curricula, materials, and methods —these may be changed almost at will as the need for change becomes apparent. But a school building, once erected, is an accomplished fact which must be accepted practically as it stands—good, bad, or indifferent. If planned in terms of today, it will be obsolete tomorrow. The responsibility involved in its creation is too great for one man to assume; the complexity and importance of the undertaking brooks no slipshod practices.

Coordination of effort on the part of those responsible for the success of a school building project is essential. Each individual involved should understand his function and the functions of the others. To the lay members of the board of education and building committee falls the task of defining policy as it relates to the educational program to be housed, and the general means of housing it. Theirs is the task of selecting an architect, of informing the public, of arranging financial and legal details, and of letting contracts. They should not undertake to dictate technical decisions relating to education and architecture, but they should familiarize themselves with the import of those decisions.

To the superintendent of schools belongs the task of defining the physical requirements for the implementation of those policies laid down by the board of education and building committee. This he must do precisely and in detail if his contribution is to be of value to the architect who must finally translate those policies and their requirements into physical form.

As has been pointed out, the building committee is responsible for the selection of the architect. Its decision in this regard is probably as important as any it will have to make. There are a number of guiding considerations that the committee should bear in mind if it is

to perform this function intelligently: First, the architect is a professional man who, like the doctor and the lawyer, has nothing to sell save his knowledge, skill, and experience. His code of ethics and his mode of operation have much in common with those of the medical and legal professions. Second, the client does not "buy" plans and specifications. These, like doctors' prescriptions, are simply instruments of service and remain the property of the architect. Third, the architect does not build the building. He can no more guarantee that the building he designs in response to the client's requirements will come within the money the client possesses than can a lawyer guarantee that he will win a case in court. Fourth, architects' fees are generally standardized. The sum the client might save by a reduction in the architect's fee is very small in relation to the losses the client might sustain through the incompetence of his architect. The architect who finds it necessary or satisfactory to cut his fee in order to obtain a commission may be justly regarded with a good deal of suspicion. In this connection, moreover, it is well to remember that an unscrupulous architect can, by means of "kick-backs" and "free engineering" services performed by manufacturers and contractors, recoup many times over any cuts in his fee, the cost of which is passed along to the owner in hidden form.

The architectural commission for the design of a school building is not an appropriate vehicle for patronage of any kind—political or friendly. Despite this fact, we still find architects being engaged not because they are the best obtainable—the only valid basis—but because they happen to be friends of the committee members, because committee members owe them political debts, even because being local men they are supposedly "entitled" to the work.

A number of methods of selecting architects are commonly employed, most of which are faulty. One such method is to invite several architects to appear before the committee for the purpose of "selling" themselves. An excellent architect may be a very poor salesman, while a man who is impressed by his own importance or who knows how to ingratiate himself may either know nothing of school building problems or be incompetent and untrustworthy. Most architects resent being regarded and treated as hucksters.

Another method of selection sometimes employed is the so-called "free sketch competition." This involves the broadcasting of open or veiled invitations to "show us your ideas" by means of fanciful drawings. The committee naïvely expects that the sketches will reveal the best architect and at the same time furnish the committee with a few free ideas. But, as I have pointed out, the committee is *not* buying a plan. An attractive sketch is by no means an accurate measure of its author's skill as an architect, his integrity, or his knowledge of a specialized field. Moreover, by adopting such a form of competition, the committee automatically deprives itself of the services of members of the American Institute of Architects which has outlawed competitions of this kind as being inimical to the best interests of the client and to professional excellence.

There is a form of competition which succeeds in overcoming some of these shortcomings. It is conducted under strict regulations designed

to preserve the anonymity of the competitors as a guard against favoritism and brain-picking, to assure each competitor of receiving identical information and instructions, to insure the actual awarding of the commission to the winner as selected by an impartial jury. However, such forms of competition are cumbersome and expensive. At best they are no sure guarantee of success.

The only satisfactory method of selecting an architect calls for *work* on the part of the members of the committee. It involves personal investigation of the architects under consideration—their offices, their staffs, their engineering assistance, their record of integrity, industry and business ability, the quality—as opposed to the quantity—of their accomplished work, the satisfaction felt by former clients. It involves visits to the offices of the architects, the inspection of buildings they have designed, interviews with those who are using those buildings. It is generally most practical for the committee to divide into teams of two or three to do this work, each team reporting its findings to the committee as a whole. When the possibilities have been narrowed down in this way to two or, at most, three, the "finalists" may well be invited to meet with the entire committee to discuss details of the problem and conditions of employment. These final interviews should be so scheduled that they will be unhurried and so that the architects will not be called upon to stand in line or even meet one another.

Under no circumstances should an architect be asked—or even permitted, if he offers—to submit sketches or perform other services without obligation to the committee. A conscientious architect will not willingly use the time and energy that are due other clients in order to gamble for another commission. When a committee accepts "free" preliminary services in the expectation that a more careful selection will be made before the final commission is awarded, it places itself at a tremendous disadvantage. There are unscrupulous architects who trade on this fact by seeking to insinuate themselves into a project with the offer of "free" services which, if accepted, serve principally to place the committee under moral obligation to them. If a committee desires preliminary services without further commitments, the only business-like way is to execute a written contract for the services desired at a stipulated fee. Once that work is performed and the fee has been paid, the committee's obligations are discharged and it is free to follow whatever future course it may wish.

In general, payments to architects cover only the architectural and structural work involved, together with necessary conferences, detailing, and supervision. They do *not* cover the services of engineers for heating, ventilating, plumbing, and electrical and sanitary work. The services of these engineers are obtained and coordinated by the architect, but he is reimbursed for such services. Nor do the services of an architect under the normal fee include the procurement of site surveys, borings, and other basic information. It is the client's place to provide the architect with all the data necessary for an intelligent attack upon the problem.

It is with regard to supervision, probably, that there arise most misunderstandings and discontent with architectural services. *Archi-*

tectural supervision includes the interpretation of the plans and specifications during construction, the coordination of the various trades, the checking of bills and claims for payment, the expediting of the work, and the judging of its acceptance. Architectural supervision cannot, nor should it be expected to, insure against faulty work of a dishonest or careless contractor. If it is necessary to set a watch against poor materials and slovenly workmanship that can be hidden from view, the services of a clerk of the works, hired by the client with the approval of the architect, are necessary. The best insurance against faulty workmanship and materials, however, is the employment of a reliable contractor; it is the architect's duty to advise his client well regarding a builder's integrity before he is awarded the contract.

There have been instances wherein the building committee, and sometimes the superintendent of schools, have expected to sit back and let the architect define the educational needs. The architect cannot properly assume the work of the committee and the superintendent. Rarely does he possess the necessary experience and training. Certainly he does not possess the authority. A committee or a superintendent that relinquishes decisions on educational questions shirks a duty and ignores an opportunity.

It is the professional obligation of the superintendent to provide the architect with a clear and detailed statement of the functions and facilities required by the policies laid down by the board of education and building committee. These educational specifications should cover the type of school, the immediate and ultimate capacity of the building, the character and objectives of the program, and the types of activities to be accommodated. They should include a detailed listing of the spaces required; their locations in the building and with respect to one another; their sizes, capacities, and other physical characteristics; their equipment; and their manner of use.

These educational specifications should be completed before the architect is engaged. Their preparation will serve to focus attention upon and clarify matters of policy, crystallize the superintendent's thinking, and provide a basis for planning in cooperation with the educational staff and the community. They become a documentary record of the conclusions and agreements reached, and serve as the architect's manual to which questions that arise during the preparation of drawings may be referred.

Indispensable though the educational specifications are, they do not substitute for direct contact between the architect and those who have contributed to the preparation of the specifications. Invariably there must exist an opportunity for the architect to discuss with the superintendent, and others who will use the building, the problems that arise during the development of the plans—the limitations of space, structure, materials, and finances that he faces, the reasons behind the solutions he has reached. Indeed the resulting conferences may become disconcertingly numerous and time-consuming—but they provide the only means through which there can evolve a meeting of minds, a satisfactory give-and-take of ideas.

In conclusion, a plea to architects. The problems involved in designing school buildings are not those obtained in our own school days. The modern school has become so complex and its social significance so tremendous that no architect, regardless of his experience and wisdom, can assume lightly the task of designing one. His mistakes are too far-reaching, too long-lasting. Progress does not come through the repetition of old patterns. School building experience alone will never insure excellence. Let the architect have the humility to refuse to undertake to design a school building unless he knows himself to possess the ability and desire to look beyond the surface of his profession, to seek out the underlying ideals and hopes of education and make them a part of himself, to look through the eyes of a child and his teacher, to glimpse a vision that is beyond his grasp yet strive unceasingly toward it. There is no field of architectural endeavor that holds out a greater challenge, none that more deserves the best that the profession can give.

SCHOOL BUILDING PLANNING IN ENGLAND

(Abstract)

by

E. T. PETERSON

As a by-product of participation in the Army Education Program as Deputy Director of the Academic Division of the U.S. Army University Center at Shrivenham, England, your speaker had the opportunity of exploring certain phases of postwar school building planning in that country.

The extent to which current thinking about planning in England and the United States is in agreement is indicated by the following statements from a recent publication on school architecture, by C. G. Stillman.

> To achieve the same results in building, the designer must be fully acquainted with the exact purpose for which the building is required, and must be adequately trained and skilled in order to translate these requirements into the appropriate form and shape. The importance of this cannot be overemphasized.
>
> It also follows that the potential user of the building must be able to give the architect clear and precise instructions, since once the plans have passed into the hands of the builder and the work commenced, it is extremely difficult and costly to make alterations; the more permanent the structure, the greater the commitments made.
>
> Later developments which cause these requirements to change will, to a varying degree, render the building less useful, depending upon the nature of the use to which the building is put.
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> In the case of schools, the constant development in education is well known, and changes brought about by the growing activities and reforms in teaching, particularly in the state elementary school, are a source of constant difficulty where the buildings are concerned.
>
> The relationship between the needs of the user and the facilities offered in building accommodation is more finely marked in the case of schools, since the building with its equipment forms an integral part of the system of education. It performs a much greater function in implementing the work and specialized character of activity than is the case in most other types of building accommodation.

The rate of change in the uses of schools is far more rapid than is generally supposed, or even than it appears. Small changes in curriculum or a small increase in the numbers of pupils lead to improvisation in even the most up-to-date buildings, and gradually and almost imperceptibly such improvisations accumulate till the whole building is actually unsuitable in arrangement or accommodation. If such a state of affairs can exist during the early years of a modern building, what will be the state of usefulness of that building at the end of its life,

which may be anything up to 100 years? The rate at which changes in education can take place is very rapid when compared with the average life of a well-constructed building.

How long will it take to reach final decisions which are now being discussed regarding postwar education, and how many of these decisions will have been made when we start to build?

It has happened that important developments and changes in policy have been in progress during the time of the erection of many new schools, and in these cases the new buildings have been technically out of date before they have been occupied. Such circumstances are perhaps exceptional but easily possible, considering that, from the time of preparing the initial plans, it may take upwards of two years, or longer, to complete the carrying out of the work.

If buildings are to provide undiminishing usefulness, retaining their full value throughout these long periods, then a better means must be found to enable the necessary changes to be made in the accommodation and type of equipment at more frequent intervals than has been found in the past.

One suggested solution is to build for a limited life of not more than 30 years, by the use of temporary or semi-permanent forms of construction. The cheaper type of timber-built schools suggested has proved generally unsatisfactory from every point of view. Apart from being inferior in architectural design, they do not provide the standard of comfort and service required, and despite all efforts to reduce initial outlay in order to make it economically possible to scrap these buildings on a short-term period, this has not been found possible. The principal reason is that a very high percentage of the total cost must be spent in equipment and installations which are essentially of a permanent character. This also applies to parts of the fabric, such as doors, windows, and floors, etc., which receive such hard wear as to make a high degree of durability again essential.

We have yet to find a building technique which will give satisfactory service, retain its good condition without deteriorating, and yet be ready for scrapping at the end of a prescribed term of years. This cannot be done, even as is often thought, by the use of timber, since a well-constructed timber building properly maintained, will last as long as brick.

It is quite evident that traditional methods are far too permanent, and particularly so where extensive use is made of rigid forms of reinforced concrete and steel. As proof of this: how often do we pull down a building, unless it has become almost a derelict or a dangerous structure, or its removal can be justified for commercial reasons, or the site is required for some important development?

Since the more solid and compact the building the more difficult it is to alter, there appears to be only one way in which to deal with this problem, i.e., the adoption of lighter forms of construction, less compact, and planned on flexible lines, using every means for facilitating the widest degree of adaptability.

The appropriate use of light steel, glass, asbestos, and various insulating wall boards, plywoods, etc., does not necessarily mean making

sacrifices of comfort, stability, or durability. Architecturally it means a change in style of building which becomes more utilitarian in character and more expressive of purpose.

The modern elementary school is particularly suited to this form of design, with its gardens and playing fields; it can be divided into separate units, each representing a distinct part of the school activity. We have, for example, the teaching units (i.e., the ordinary classroom blocks and practical rooms), the administrative block (containing staff-rooms, cloakrooms, lavatories, stores, etc.), the assembly rooms, gymnasium, and the kitchen and dining room. These educational units, considered as independent blocks, can be arranged in pleasant groups, planned in proper relationship, orientated according to aspect, sited according to levels, approaches, etc., and constructed with a framework which will allow complete interchangeability of internal partitions. They can be connected together by means of short enclosed corridors or, in some cases where desirable, left free standing. The more independent they are, the more easily can they be extended or altered, without interference to adjacent blocks.

In light of these ideas, the following principles of school design are suggested:

1. Schools must be flexible enough to conform to the changing needs of education.
2. Buildings must be durable to take hard wear and so are bound to outlast their suitability.
3. Hence buildings must be constructed of loosely connected units capable of separate alteration.
4. These units must be capable of assembly in different arrangements to suit the requirements of differing sites and the needs of differing communities.
5. Pre-fabricated parts must be standardized for these units individually and not for the whole school as a unit, as the latter course would involve forcing areas of different uses to conform to one set of standardized dimensions, etc.
6. All sites must be provided initially large enough for the full requirements as to playing fields and playgrounds and still allow for extensions to buildings.

One of the most interesting developments in England is in Cambridgeshire—the village colleges. They are largely the result of the thinking and planning of a great educator, Henry Morris. They grew out of two ideas: (1) coordinated planning in terms of a rural region consisting of eight to ten villages; and (2) centering the educational, cultural, social, and recreational activities of the region in a new type of community school. The following description of the Village College at Impington is taken from the current schedule of activities.

> Impington can be roughly described as a Community Centre housing a Modern Secondary School. The Centre serves a population of about 10,000 in ten villages. It was advised by Henry Morris, Chief Education Officer for the County, and designed by Walter Gropius (now Professor of Architecture at Harvard University, U.S.A.) and Maxwell Fry. Class Rooms and Crafts

Rooms are all specialised—for English, History, Science, Geography, Needlework, Woodwork and Metalwork, Domestic Science, and Art. Above all, they are pleasantly decorated rooms furnished with chairs and tables instead of desks and designed from the outset for use by adults as well as children. This is important; for there is a fundamental objection to the housing of adult classes in school rooms unless they are, like these rooms, designed for both purposes. The Hall seats 320 and has a well-equipped stage and cinema projection room; this is the village cinema, theatre and dancehall, as well as the school assembly hall and gymnasium. And there is a wing confined to adult use consisting of a Common Room, three Games Rooms (for Billiards, Table Tennis, Darts, Cards, etc.), a fine panelled Lecture Room, with Library adjacent, and a Committee Room. We who use it find the building practical, and easy to work in. But it is also beautiful, in structure, furnishing, and decoration. It has been made so in the belief that a golden way of developing taste in young and old is to design our public buildings as works of art.

The programme which follows will give you a fair idea of the uses of the College. It includes all regular activities except those of the Modern Secondary School which is in possession during the day. As you will see, it serves many groups of people—school children, students at evening classes, members of clubs and societies, users of common room, canteen and library, and those who come to public functions (dances, concerts, plays, films, etc.). The groups overlap, and it is therefore difficult to estimate how many people the institution serves. But the number must be something like a thousand a week. There is no membership of the College as such; the vital link between all these groups using the College is the Students' Council.

We believe that education is a continuous process extending, in a normal person, throughout childhood, youth, and the whole of adult life. By housing organizations appropriate to all three stages in one building we hope to provide an easy passage from school to youth activities and from these to adult activities. We find that about two-thirds of the children leaving the Modern Secondary School do in fact come back to us in the evenings. The youth work of the College gains over that of the ordinary Youth Centre by the fact that young people are not segregated and they can, and do, join in adult activities quite freely. It is handicapped at present by the lack of any separate accommodation for games and social activities. But plans have been prepared and money found for the addition of a youth wing, with Common Room, Games Rooms, and Canteen. The Education Committee await permission to build.

There are several additions which we hope to get now the war is over—a swimming pool with Physical Training Room adjacent; a Dining Hall; and a Hostel for 50 to 100 beds. Residential Courses, especially during weekends, are becoming a regular feature of local adult education.

We believe that adult education is essentially a social process, that lectures, reading, and discussion should be connected with the practice of the arts and crafts and should be made part of the social life of a democratic community. Hence the wide range of this programme and the insistence upon self-government.

But the work of the Village College is not confined within its walls. It offers a two way service to every one of the ten villages within our area, by providing at Impington courses which

need special facilities and equipment, and by offering appropriate courses and facilities in each village. Throughout its area the Village College can provide the countryman with some of the social life, the entertainments, and the opportunities which the town offers. But it provides them (1) in a rural environment, (2) in a self-governing community, and (3) with a cultural background.

The extraordinary variety of evening activities is indicated by the weekly schedule. On Monday evening there is the Young Farms Fortnightly; Agricultural Mechanics; The World Today (W.E.A. Course); German; Recreational Physical Training, Girls; Woodwork and Metal work; Handicrafts; Glovemaking; Dressmaking; Combined Courses—Practical, Woodwork, Metalwork, Shorthand and Typing; Junior Red Cross; Army Cadets; Junior Drama; Library; Rugmaking—At Landbeach.

On Tuesday evening there is the Household Needlework; Folk Dancing; Choral Singing; French; Woodwork; Metalwork and Plastics; Cookery; Handicrafts; Combined Courses—Mathematics, English, Bookkeeping and Office Procedure; Dressmaking; Household Needlework and Stitchcraft; Dramatic Society; Religious Discussion Group; Library.

On Wednesday evening there is the Make-do and Mend; "Music and the Ordinary Listener"; Recreational Physical Training, Boys; Youth Club; Craftsmen's Guild; Dressmaking; Model and Experimental Engineering; Junior Red Cross; Army Cadets.

On Thursday evening there is the Make-do and Mend—At Girton; Parents and Children; Allotment Association—Monthly; Music Society—Monthly; Agricultural Society—Monthly; Film Society; Woodwork and Metalwork; Model Engineering and Aeromodelling Club; Old-Time Ballroom Dancing Society—Fortnightly; Badminton Club—Fortnightly; B.B.C., Discussion Group; The Problems before UNO—At Girton; "Some Political and Social Problems Today"—At Coton.

On Friday evening there is the Household Needlework; Aeromodelling Club; Glovemaking; Senior Discussion Group—Fortnightly; Country Dancing—Girton; The World Today—Milton.

The following publications are of special interest in reviewing school planning trends in England:

The Architect's Yearbook, published by Paul Elek, Diamond House, 36 Hatton Garden, London, E.C.1.

Postwar Building Studies (No. 2, "Standard Construction for Schools"; No. 12, "The Lighting of Buildings"; No. 21, "School Buildings for Scotland"), by the Ministry of Works, published by His Majesty's Stationery Office, York House, Kingsway, London, W.C.2.

Elementary School Buildings. Board of Education, Pamphlet 107. Published by His Majesty's Stationery Office, York House, Kingsway, London, W.C.2.

Community Centres. Ministry of Education. Published by His Majesty's Stationery Office, York House, Kingsway, London, W.C.2.

CONFERENCE SUMMARY

by

PAUL W. SEAGERS

THE conference just drawing to a close, one of the most comprehensive school building conferences of late years, has been sponsored by the School of Education of Indiana University.

Dean Wendell W. Wright, of the School of Education here, opened the conference with a welcome to the group attending. In introducing the major topic of the conference, the planning of school buildings for tomorrow's educational needs, he called particular attention to the fact that the whole child learns and that children who go to dark, dingy, unattractive schools are losing some of their desirable potential growth and development.

Dean E. T. Peterson, of the School of Education at the State University of Iowa, in his Friday morning address, discussed schoolhouse planning from the educational point of view. He stressed the importance of determining the outstanding features of tomorrow's school program in order that these could be given consideration in planning new buildings. One of the major responsibilities of the schools today and in the future is that of introducing constructive influences to correct the poor attitudes the pupils build up through contact with many of the other educational agencies of today—attitudes that are developed as a result of war, of poor movies or radio programs, or of cheap comics or pulp magazine reading for children. The school of tomorrow must be a community school, for tomorrow's community, in which citizens are given a new approach to the responsibilities of the school. According to Dean Peterson, the two main problems of the school today are: first, the problem of the rural community which does not have the finances to hire services that the city can hire; and second, the problem of projecting the needs of the entire community into this larger conception of the school of the future.

W. T. Clapp, Chief of the Division of School Plant, of the Michigan State Department of Public Instruction, and President of the National Council on Schoolhouse Construction, outlined a guide developed by the Council for planning school plants. He pointed out that our nation faces the largest volume of schoolhouse construction in history, because of the great lack of replacement during the depression and war years. To build schools which fit the needs of our future educational program, school men should define their philosophy and needs in terms of a projected program and should give the educational specifications to the architect. In 24 states in the Union, organized school building service is provided in the state department of education. Such service can be of great value to school administrators in planning for the future. The

Guide to School House Planning is also of great help to school men, but is perhaps more in the nature of how to plan than of what to plan. Mr. Clapp closed his address with the statement that "we shall get good buildings when we get real cooperative planning from people who are going to use these buildings."

H. B. Allman, Director of Summer Sessions at Indiana University, stated the objectives of the conference.

Architect John E. Nichols, of West Hartford, Connecticut, discussed the school building construction problem today, stating that he believed the principal problem is that of building costs. The great increase in costs is due in part to the increase in the cost of labor and material, and in part to the need for larger schoolrooms and increased facilities such as the auditorium, gymnasium, cafeteria, library, toilets, etc. He suggested that a more thorough study of the tax base for construction of buildings be made, for few schools are at present financially able to meet their proposed building program costs and are therefore cutting out vital parts of the building, equipment, and mechanical features, and lowering the quality of construction. Inadequate building is not advisable, either for the present program or for the future program. In the general discussion which followed Mr. Nichols' address, the question of temporary buildings came up, and it was suggested that prefabrication and modular construction may be one of the answers in reducing prices.

Leonard V. James, lighting consultant for the General Electric Company, gave an interesting technical talk on school lighting. He wished lighting to be considered as a complete environmental condition enabling a person to see, which would include brightness of the environment rather than include lighting fixtures only. He discussed the proposed standards of practice in lighting as set up by the Institute of Electrical Engineers and discussed the close relationship between quantity and quality of lighting. He stressed the fact that brightness is one of the most important factors of illumination, and suggested methods of controlling it. High efficiency, low brightness luminaires can easily provide the recommended conditions. Mr. James also mentioned the work on natural lighting, using clerestory, bilateral, and baffle-type windows. He suggested that one of the important problems of the school administrator is to determine now what proportional cost of the total budget he is willing to give to lighting. The indications are that in the future we will have a higher level of illumination with more improved fixtures.

The evening meeting of the conference was a panel discussion of building problems. High points brought out in this discussion were the facts that we cannot justify using school buildings only 30 to 40 hours a week when they could be used during evenings and weekends for community affairs. This would necessitate community planning for a long-range program. The buildings of the future should give more attention to the elimination of nervous strain and unnecessary noise, thus contributing to proper relaxation habits as well as to activity habits. The main influences on school buildings are money, the philosophy of the school, and technical means. The problem of high costs of building programs may be partially met by establishing a new tax base, using archi-

tectural ingenuity, developing new programs, conducting research on buildings, paying attention to remodeling, and waiting for firm bids. If the public is made fully aware of the need for school buildings we can triple our expenditures for this purpose.

On Saturday morning Dean E. T. Peterson gave an interesting account of England's progress in planning schools. The new reforms propose village colleges which are in effect community centers, used as a focal point for all regional life and activity. In construction, the English are getting away from the traditional type and are tending more to the functional type with a separation of units. Their biggest contribution is that of designing the plants for the age groups who are to use them. Dean Peterson spoke at length of the Impington school, which is truly a community center with 16 organizations using the school plants. Here two thirds of the youngsters leaving senior school participate in youth night programs.

At the last address before this summary of the conference was given, John E. Nichols listed a number of things that school boards and administrators should know. He pointed out particularly that a school building program is too large and complex for any one man to undertake—it needs the cooperation of the architect, the engineer, the school man, and the citizen; that a good architect, whose services are purchased on the basis of his skill, integrity, and years of experience, should be selected; and that the superintendent of schools should furnish the architect with a statement of the needs.

BULLETINS IN THE FIELD OF EDUCATION, INDIANA UNIVERSITY

The Bulletin of the School of Education, Indiana University, was first published in 1924 and has appeared regularly since that time. Research studies of interest to educators, proceedings of conferences held, and bibliographies of educational materials have been the principal fields touched upon in these bulletins. A complete list of the bulletins may be obtained from the School of Education upon request. The studies included in the present volume and in the two volumes immediately preceding it in date are listed below. Unless otherwise noted, these may be obtained for 50 cents each from the Indiana University Bookstore, Bloomington, Indiana.

One Hundred Fifty Years of Arithmetic Textbooks. By Henry Lester Smith, Merrill T. Eaton, and Kathleen Dugdale. Vol. XXI, No. 1, 1945. 153 p.

Bibliography of School Buildings, Grounds, and Equipment, Part V. By Henry Lester Smith and Harold E. Moore. Vol. XXI, No. 2, 1945. 79 p.

School Library Personnel in Indiana. By Margaret I. Rufsvold. Vol. XXI, No. 3, 1945. 80 p.

Source Material Relating to the Development of Education in Indiana. By Velorus Martz and Henry Lester Smith. Vol. XXI, No. 4, 1945. 95 p.

Bibliography of School Buildings, Grounds, and Equipment, Part VI. By Henry Lester Smith and Harold E. Moore. Vol. XXI, No. 5, 1945. 73 p.

Analysis of the Proficiency in Silent Reading of 15,206 Sixth Grade Pupils in 648 Schools in Indiana. By Henry Lester Smith and Merrill T. Eaton. Vol. XXI, No. 6, 1945. 52 p.

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